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ANNUAL REPORT

OF THE

MINISTER OF MINES

FOR THE

YEAR ENDING 31st DECEMBER,

1903,

BEING AN ACCOUNT OF

MINING OPERATIONS FOR GOLD, COAL, ETC.,

IN THE

PROVINCE OF BRITISH COLUMBIA.

Printed by authority of the Legislative Assembly.

VICTORIA, B. C.
Printed by RICHARD WOLFENDEN, I.S.O., V.D., Printer to the King's Most Excellent Majesty.
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TILDEN FOUNDATIONS
1904

REPORT

OF THE

MINISTER OF MINES,

1903.

To His Honour the Honourable Sir Henri Gustave Joly de Lotbinière, K.C.M.G.,
Lieutenant-Governor of the Province of British Columbia.

May it please Your Honour:

The Annual Report of the Mining Industries of the Province for the year 1903 is herewith respectfully submitted.

RICHARD McBRIDE,
Minister of Mines.

Minister of Mines' Office,
March 11th, 1904.

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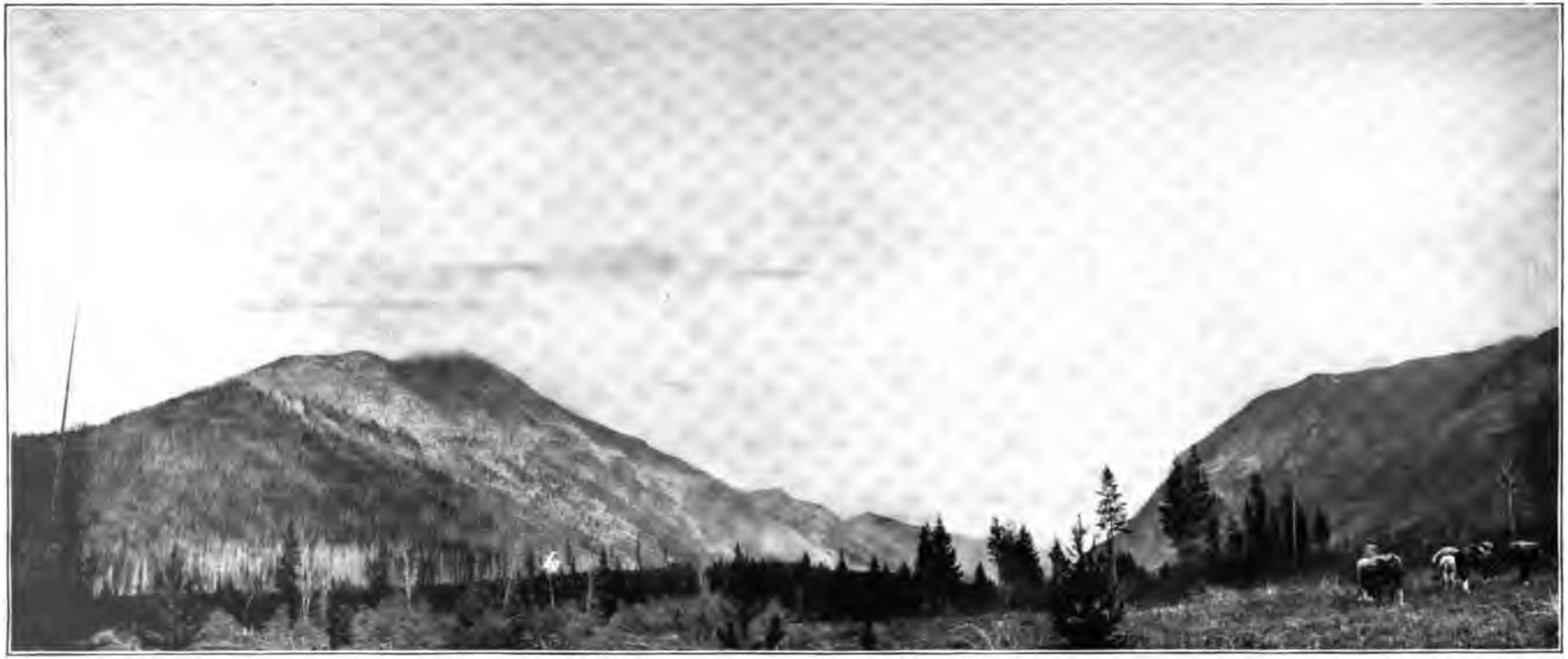

VIEW UP SAGE CREEK, FLATHEAD DISTRICT, EAST KOOTENAY—(**X** indicates position of Oil Spring).

REPORTS

—BY—

WILLIAM FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

To the Hon. Richard McBride,
Minister of Mines.

Sir,—I have the honour to submit herewith my Annual Report on the Mining Industry of the Province for the year ending December 31st, 1903.

The following statistical tables give the total mineral output of the Province to date, and show in considerable detail the actual mineral production of the past year, as based on smelter or mill returns; also a summary of the production of each of the last four years, thus illustrating by comparison the progress made in productive mining during this period.

To facilitate comparison with information previously given, I have retained, as closely as was possible, the general form already established for such tables and for the Report.

This Report is somewhat delayed owing to the difficulty experienced in getting the Statistical Returns from some of the shipping mines, these returns having in certain instances been withheld for over two months, and I must recommend that in future the penalties of the Act be strictly enforced.

I have the honour to be,
Sir,
Your obedient servant,
William Fleet Robertson,
Provincial Mineralogist.

Victoria, B. C., March 11th, 1904.

MINERAL PRODUCTION OF BRITISH COLUMBIA.

METHOD OF COMPUTING PRODUCTION.

In assembling the output for the lode mines in the following tables, the established custom of this Department has been adhered to, viz.: The output of a mine for the year is considered that amount of ore for which the smelter or mill returns have been received during the year. This system does not give the exact output of the mine for the year, but rather the amounts credited to the mine on the company's books during such year.

For ore shipped in December the smelter returns are not likely to be received until February in the new year, or later, and have, consequently, to be carried over to the credit of such new year. This plan, however, will be found very approximate for each year, and ultimately correct, as ore not credited to one year is included in the next.

In the Lode Mines tables, the amount of the shipments has been obtained from certified returns received from the various mines, as provided for in the "Inspection of Metalliferous Mines Act, 1897." In calculating the values of the products, the average price for the year in the New York Metal Market has been used as a basis. For silver 95 per cent., and for lead 90 per cent., of such market price has been taken. Treatment and other charges have not been deducted.

TABLE I.—Total Production for all Years up to and including 1903.

Gold, placer	$65,688,103
Gold, lode	26,862,348
Silver	19,997,354
Lead	11,137,265
Copper	16,803,754
Coal and Coke	63,321,869
Building stone, bricks, etc	3,325,000
Other metals	88,799
Total	$207,224,492

TABLE II.—Production for each Year from 1890 to 1903 (inclusive).

1852 to 1889 (inclusive)	$71,981,634
1890	2,608,803
1891	3,521,102
1892	2,978,530
1893	3,588,413
1894	4,225,717
1895	5,643,042
1896	7,507,956
1897	10,455,268
1898	10,906,861
1899	12,393,131
1900	16,344,751
1901	20,086,780
1902	17,486,550
1903	17,495,954
Total	$207,224,492

Table III. gives a statement in detail of the amount and value of the different mineral products for the years 1901, 1902 and 1903. As it has been impossible as yet to collect accurate statistics regarding building stone, lime, bricks, tiles, etc., these are estimated.

TABLE III.

AMOUNT AND VALUE OF MINERAL PRODUCTS FOR 1901, 1902 AND 1903.

	Customary Measure.	1901.		1902.		1903.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer.....	Ounces.......	48,505	$ 970,100	53,657	$ 1,073,140	53,021	$ 1,060,420
″ lode........	″	210,384	4,348,603	236,491	4,888,269	232,831	4,812,616
Silver............	″	5,151,333	2,884,745	3,917,917	1,941,328	2,996,204	1,521,472
Copper	Pounds	27,603,746	4,446,963	29,636,057	3,446,673	34,359,921	4,547,535
Lead	″	51,582,906	2,002,733	22,536,381	824,832	18,089,283	689,744
Coal.............	Tons, 2,240lbs	1,460,331	4,380,993	1,397,394	4,192,182	1,168,194	3,504,582
Coke	″ ″	127,081	635,405	128,015	640,075	165,543	827,715
Other materials...	....	....	417,238	....	480,051	....	531,870
			$20,086,780		$ 17,486,550		$17,495,954

TABLE IV.

PRODUCTION OF MINERAL BY DISTRICTS AND DIVISIONS.

NAME.	DIVISIONS.			DISTRICTS.		
	1901.	1902.	1903.	1901.	1902.	1903.
CARIBOO DISTRICT.............	....	....	....	$ 538,700	$ 540,395	$ 475,200
Cariboo Mining Division	$ 279,600	$ 340,395	$ 314,400	....	....	....
Quesnel ″	240,000	160,000	132,000	....	....	....
Omineca ″	19,100	40,000	28,800	....	....	....
CASSIAR DISTRICT	....	....	....	322,949	426,636	480,368
KOOTENAY, EAST, DISTRICT	....	....	....	2,746,839	1,477,466	1,951,128
KOOTENAY, WEST, DISTRICT.....	....	....	....	8,159,662	7,806,399	6,603,981
Ainsworth Division...........	331,011	272,967	219,818	....	....	....
Nelson ″	1,244,568	818,494	653,457	....	....	....
Slocan ″	1,865,752	1,608,827	1,126,986	....	....	....
Trail Creek ″	4,621,299	4,938,395	4,308,458	....	....	....
Other parts.................	97,032	167,716	295,262	....	....	....
LILLOOET DISTRICT...........	....	....	....	48,383	31,429	31,283
YALE DISTRICT	....	....	....	3,317,686	2,843,537	3,714,422
Osoyoos, Grand Forks & Kettle River Divisions	3,250,986	2,782,263	3,654,234	....	....	....
Similkameen Division.........	4,680	2,700	2,000	....	....	....
Yale ″	62,020	58,574	58,188	....	....	....
COAST DISTRICTS (Nanaimo, Alberni, W. Coast V. I., Victoria)..	....	....	....	4,952,561	4,360,688	4,239,572
				$20,086,780	$17,486,550	$17,495,954

PLACER GOLD.

Table V. contains the yearly production of placer gold to date, as determined by the returns, sent in by the banks and express companies, of gold transmitted by them to the mints, and from returns sent in by the Gold Commissioners and Mining Recorders. To these yearly amounts one-third was added up to the year 1878, from then to 1895 and from 1898 to 1903, one-fifth, which proportions are considered to represent, approximately, the amount of gold sold of which there is no record. This placer gold contains from 10 to 25 per cent. silver, but the silver value has not been separated from the totals, as it would be insignificant.

TABLE V.—Yield of Placer Gold per Year to Date.

1858	$ 705,000	1881	$1,046,737
1859	1,615,070	1882	954,085
1860	2,228,543	1883	794,252
1861	2,666,118	1884	736,165
1862	2,656,903	1885	713,738
1863	3,913,563	1886	903,651
1864	3,735,850	1887	693,709
1865	3,491,205	1888	616,731
1866	2,662,106	1889	588,923
1867	2,480,868	1890	490,435
1868	3,372,972	1891	429,811
1869	1,774,978	1892	399,526
1870	1,336,956	1893	356,131
1871	1,799,440	1894	405,516
1872	1,610,972	1895	481,683
1873	1,305,749	1896	544,026
1874	1,844,618	1897	513,520
1875	2,474,004	1898	643,346
1876	1,786,648	1899	1,344,900
1877	1,608,182	1900	1,278,724
1878	1,275,204	1901	970,100
1879	1,290,058	1902	1,073,140
1880	1,013,827	1903	1,060,420
		Total	$65,688,103

TABLE VI.—Production of Lode Mines.*

Year.	Gold.		Silver.		Lead.		Copper.		Total Values.
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	
		$		$		$		$	$
1887	....	....	17,690	17,331	204,800	9,216	....	....	26,547
1888	....	....	79,780	75,000	674,500	29,813	....	....	104,813
1889	....	....	53,192	47,873	165,100	6,498	....	....	54,371
1890	....	....	70,427	73,948	*Nil.*	*Nil.*	....	....	73,948
1891	....	....	4,500	4,000	*Nil.*	*Nil.*	....	....	4,000
1892	....	....	77,160	66,935	808,420	33,064	....	....	99,999
1893	1,170	23,404	227,000	195,000	2,135,023	78,996	....	....	297,400
1894	6,252	125,014	746,379	470,219	5,662,523	169,875	324,680	16,234	781,342
1895	39,264	785,271	1,496,522	977,229	16,475,464	532,255	952,840	47,642	2,342,397
1896	62.259	1,244,180	3,135,343	2,100,689	24,199,977	721,384	3,818,556	190,926	4,257,179
1897	106,141	2,122,820	5,472,971	3,272,836	38,841,135	1,390,517	5,325,180	266,258	7,052,431
1898	110,061	2,201,217	4,292,401	2,375,841	31,693,559	1,077,581	7,271,678	874,781	6,529,420
1899	138,315	2,857,573	2,939,413	1,663,708	21,862,436	878,870	7,722,591	1,351,453	6,751,604
1900	167,153	3,453,381	3,958,175	2,309,200	63,358,621	2,691,887	9,997,080	1,615,289	10,069,757
1901	210,384	4,348,603	5,151,333	2,884,745	51,582,906	2,002,733	27,603,746	4,446,963	13,683,044
1902	236,491	4,888,269	3,917,917	1,941,328	22,536,381	824,832	29,636,057	3,446,673	11,101,102
1903	232,831	4.812,616	2,996,204	1,521,472	18,089,283	689,744	34,359,921	4,547,535	11,571,367
To'l	1,310,321	26,862,348	34,636,407	19,997,354	298,290,128	11,137,265	127,012,401	16,880,735	74,800,721

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* The information as to production in the earlier years is obtained from the "Mineral Statistics and Mines" for 1896, Geological Survey of Canada.

TABLE VII.—PRODUCTION IN DETAIL OF THE

DISTRICT.	YEAR	TONS.	GOLD—PLACER.		GOLD—LODE.		SILVER.		COPPER.	
			Ounces	Value.	Ounces.	Value.	Ounces.	Value.	Pounds.	Value.
				$		$		$		$
Cariboo										
Cariboo Division	1900		8,100	162,000						
	1901		13,980	279,600						
	1902	21	17,000	340,000	19	393	4	2		
	1903		15.720	314.400						
Quesnel "	1900		25,500	510,000						
	1901		12,000	240,000						
	1902		8,000	160,000						
	1903		6.600	132.000						
Omineca "	1900		626	12,527						
	1901		955	19,100						
	1902		2,000	40,000						
	1903		1.440	28.800						
Cassiar										
Atlin Lake Division	1900	300	22,500	450,000	120	2,479				
	1901	8	15,000	300,000						
	1902		20,000	400,000						
	1903		22.000	440.000						
All other Divisions	1900		750	15,000						
	1901		1,140	22,800	5	103	82	46		
	1902	100	800	16,000	474	9,797	224	111	6,258	728
	1903	67	1.750	35.000	244	5.043	53	27	2.249	298
East Kootenay										
Fort Steele Division	1900	86,868	500	10,000			960,411	560,303		
	1901	62,934	630	12,600			718,451	402,333		
	1902	3,621	1,650	33,000			114,506	56,738		
	1903	938	1.000	* 20.000			28.537	14.491		
Other Divisions	1900	94	15	300			2,219	1,295	2,147	348
	1901	838	40	800			34,181	19,141	3,272	527
	1902	260			16	331	27,918	13,833	8,048	936
	1903	803			17	352	59.006	29.963	2.730	361
West Kootenay										
Ainsworth Division	1900	5,313			28	578	352,167	205,454		
	1901	5,938			63	1,312	324,918	181,951		
	1902	4,939			5	103	320.719	158,916	9,537	1,109
	1903	24.332			33	682	108.678	55.187		
Nelson "	1900	94,378	30	600	31,612	653,106	109,870	64,098	36,929	5,979
	1901	109,226			32,868	679,340	377,167	211,213	1,599,449	257,671
	1902	77,810			25,116	519,148	273,870	135,703	491,144	57,120
	1903	76.923	100	* 2.000	20.114	415.756	190.003	96.483	346.218	45.822
Slocan "	1900	25,520			5	103	2,121,176	1,237,495		
	1901	25,493			244	5,043	2,276,259	1,274,705		
	1902	21,153			353	7,297	2,223,810	1,101,898		
	1903	12.412			257	5.312	1.466.931	744.908	181	24
Trail Creek "	1900	217,636			111,625	2,306,172	167,378	97,648	2,071,865	335,435
	1901	283,360			132,333	2,735,323	970,460	543,458	8,333,446	1,342,518
	1902	329,534			162,146	3,351,558	373,101	184,871	11,667,807	1,356,966
	1903	360.786			145.353	3.004.446	203.537	103.403	8.652.127	1.145.109
All other Divisions (Revelstoke, Trout Lake, Lardeau.)	1900	622	250	5,000	208	4,297	96,416	56,249		
	1901	930	100	2,000	234	4,837	133,774	74,913		
	1902	1,692	100	2,000	652	13,477	241,584	119,705	1,000	116
	1903	5.430	100	* 2.000	2.417	49.959	392.354	199.237	3.234	436
Lillooet										
	1900	5,713	1,845	36,905	2,497	51,588				
	1901	4,150	1,304	26,080	1,079	22,303				
	1902	2,882	1,372	27,440	193	3,989				
	1903	3.652	1.291	25.820	234	5.457	12	6		
Yale										
(Grand Forks, Greenwood and Osoyoos Divisions.)	1900	103,426			18,133	374,628	112,145	65,426	5,672,177	918,325
	1901	396,210	250	5,000	37,388	772,810	241,489	135,234	14,511,787	2,337,849
	1902	521,402	250	5,000	42,745	883,539	219,798	108,910	14,955,582	1,739,384
	1903	697.284	150	* 3.000	50.358	1.040.900	320.749	162.876	18.485.542	2.446.561
† Similkameen Div'n. (Vernon.)	1900		240	4,800						
	1901		234	4,680						
	1902		135	2,700						
	1903		100	2.000						
Yale Division (Ashcroft, Kaml'ps.)	1900	580	2,877	57,542						
	1901	3,374	2,272	45,440	18	370	74	41	39,920	6,431
	1902	3,783	2,350	47,000	6	124	542	269		
	1903	22	2.520	50.400	3	62	15	8	6.409	848
‡ Coast & other Districts										
(Nanaimo, Alberni, W. Coast V. I., Victoria).	1900	14,346	703	14,050	2,925	60,430	36,393	21,232	2,193,962	355,202
	1901	27,965	600	12,000	6,152	127,162	74,483	41,710	3,115,872	501,967
	1902	31,802			4,766	98,513	121,841	60,372	2,496,681	290,364
	1903	103.524	250	* 5.000	13.771	284.647	220.329	111.883	6.861.171	908.076
§ Miscellaneous										
(other metals, building stone, brick, etc.)	1900									
	1901									
	1902									
	1903									
TOTALS										
	1900	554,796	63,936	1,278,724	167,153	3,453,381	3,958,175	2,309,200	9,997,080	1,615,289
	1901	920,416	48,505	970,100	210,384	4,348,603	5,151,333	2,884,745	27,603,746	4,446,963
	1902	998,990	53,657	1,073,140	236,491	4,888,269	3,917,917	1,941,328	29,636,057	3,446,673
	1903	1,286.176	53,021	$1.030.420	232.831	$4.812.616	2.996.204	$1.521.472	34.359.921	$4,547.535

‡ Iron Ore - 2,290 tons (value included in Miscellaneous). * Estimated.

METALLIFEROUS MINES FOR 1900, 1901, 1902 AND 1903.

LEAD.		TOTALS FOR DIVISIONS.				TOTALS FOR DISTRICTS.			
Pounds.	Value.	1900.	1901.	1902.	1903.	1900.	1901.	1902.	1903.
	$	$	$	$	$	$	$	$	$
						684,527	538,700	540,395	475,200
		162,000							
			279,600						
				340,395					
					314,400				
		510,000							
			240,000						
				160,000					
					132,000				
		12,527							
			19,100						
				40,000					
					28,800				
						467,479	322,949	426,636	480,368
		452,474							
			300,000						
				400,000					
					440,000				
		15,000							
			22,949						
				26,636					
					40,368				
						2,215,560	1,592,663	222,778	128,797
38,494,077	1,639,848	2,210,151							
29,129,128	1,127,036		1,541,969						
3,017,756	110,450			200,188					
717,479	27,357				61,848				
81,354	3,466	5,409							
775,016	30,226		50,694						
204,652	7,490			22,590					
951,296	36,273				66,949				
						6,020,783	8,159,662	7,716,399	6,498,981
3,366,962	143,433	349,465							
3,788,412	147,748		331,011						
3,083,039	112,839			272,967					
4,299,727	163,949				219,818				
1,485,899	63,299	787,082							
2,470,350	96,344		1,244,568						
1,680,948	61,523			773,494					
1,072,542	40,896				600,957				
19,565,743	826,310	2,063,908							
15,025,759	586,004		1,865,752						
13,651,144	499,632			1,608,827					
9,880,469	376,742				1,126,986				
		2,739,300							
1,045	45		4,621,299						
				4,893,395					
					4,255,958				
363,439	15,482	81,028							
391,844	15,282		97,032						
885,734	32,418			167,716					
1,144,239	43,630				295,262				
						88,493	48,383	31,429	31,283
		88,493							
			48,383						
				31,429					
					31,283				
						1,420,725	3,307,948	2,787,356	3,707,552
102	4	1,358,383							
2,397	92		3,250,986						
13,108	480			2,737,263					
23,531	897				3,654,234				
		4,800							
			4,680						
				2,700					
					2,000				
		57,542							
			52,282						
				47,393					
					51,318				
						450,914	682,839	449,249	1,309,606
		450,914							
			682,839						
				449,249					
					1,309,606				
						251,740	417,238	480,051	531,870
		251,740							
			417,238						
				480,051					
					531,870				
63,358,621	2,691,887					$ 11,600,221			
51,582,906	2,002,733						$ 15,070,382		
22,536,391	824,832							$ 12,654,293	
18,089,283	$689,744				13,163,657				$13,163,657

† Platinum, in 1901, $457 ; in 1902, $190 (included in Placer Gold). § Building Stone, Brick, &c., $525,000 ; Iron Ore, $6,870.

TABLE VIII.—COAL AND COKE PRODUCTION PER YEAR TO DATE.

YEARS.	TONS (2,240 lbs.).	VALUE.
	Coal.	
1836-59	37,385	$ 149,548
1860	14,246	56,988
1861	13,774	55,096
1862	18,118	72,472
1863	21,345	85,380
1864	28,632	115,528
1865	32,819	131,276
1866	25,115	100,460
1867	31,239	124,956
1868	44,005	176,020
1869	35,802	143,208
1870	29,843	119,372
1871-2-3	148,549	493,836
1874	81,547	244,641
1875	110,145	330,435
1876	139,192	417,576
1877	154,052	462,156
1878	170,846	512,538
1879	241,301	723,903
1880	267,595	802,785
1881	228,357	685,071
1882	282,139	846,417
1883	213,299	639,897
1884	394,070	1,182,210
1885	265,596	796,788
1886	326,636	979,908
1887	413,360	1,240,080
1888	489,301	1,467,903
1889	579,830	1,739,490
1890	678,140	2,034,420
1891	1,029,097	3,087,291
1892	826,335	2,479,005
1893	978,294	2,934,882
1894	1,012,953	3,038,859
1895	939,654	2,818,962
1896	896,222	2,688,666
1897	882,854	2,648,562
1898	1,135,865	3,407,595
1899	1,306,324	3,918,972
1900	1,439,595	4,318,785
1901	1,460,331	4,380,993
1902	1,397,394	4,192,182
1903	1,168,194	3,504,582
Total	19,989,390 tons.	$60,349,694
	Coke.	
1895-6	1,565	$ 7,825
1897	17,831	89,155
1898 (estimated)	35,000	175,000
1899	34,251	171,255
1900	85,149	425,745
1901	127,081	635,405
1902	128,015	640,075
1903	165,543	827,715
Total	594,435 tons.	$2,972,175

TABLE IX.

Showing Comparative Mineral Production for 1902 of British Columbia and Other Provinces of the Dominion.

	Dominion Total.	YUKON TERRITORY.
Gold	....	$14,500,000

	Dominion Total.	BRITISH COLUMBIA.	ALL OTHER PROVINCES COMBINED.
Gold	$6,241,245	$5,961,409	$ 279,836
Silver	2,280,957	1,941,328	339,629
Copper	4,553,695	3,446,673	1,107,022
Lead	935,870	824,832	111.038
Iron	1,108,030	30,051	1,077,979
Nickel	5,025,903	———	5,025,903
Coal	15,538,610	4,192,182	11,346,429
Coke	1,538,930	640,075	898,855
Total	....	$17,036,550	$20,186,691

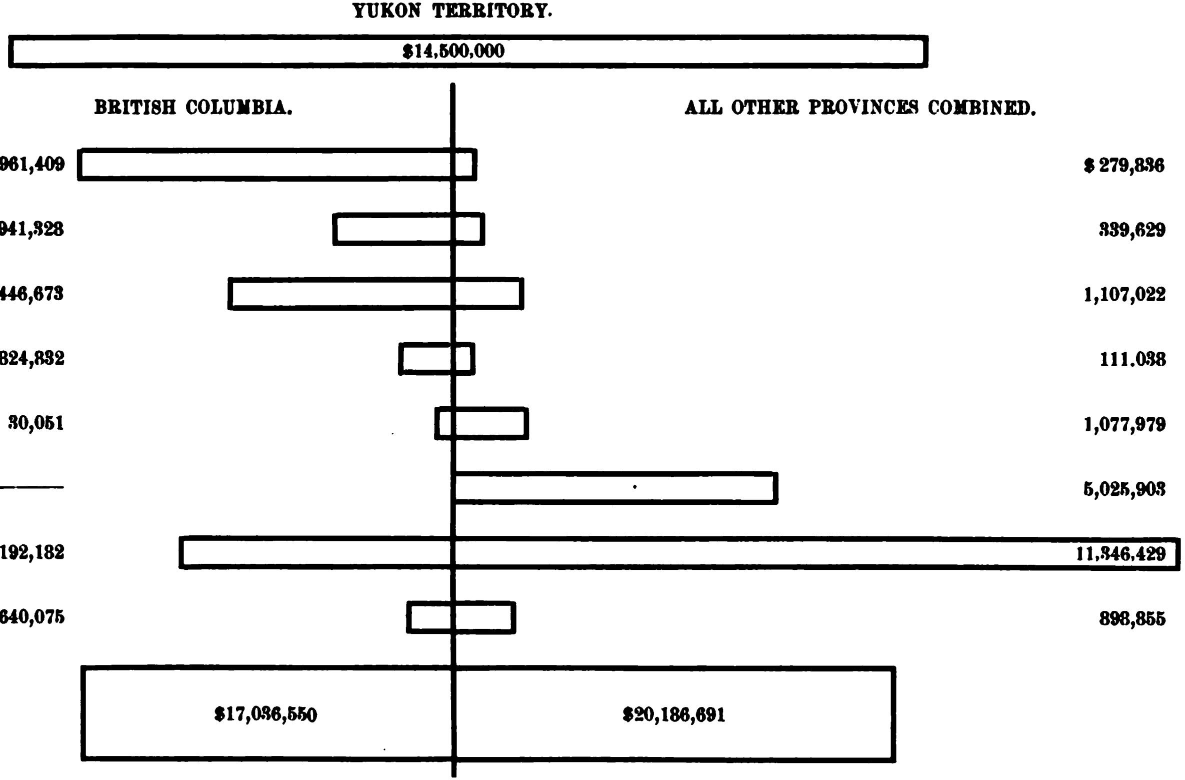
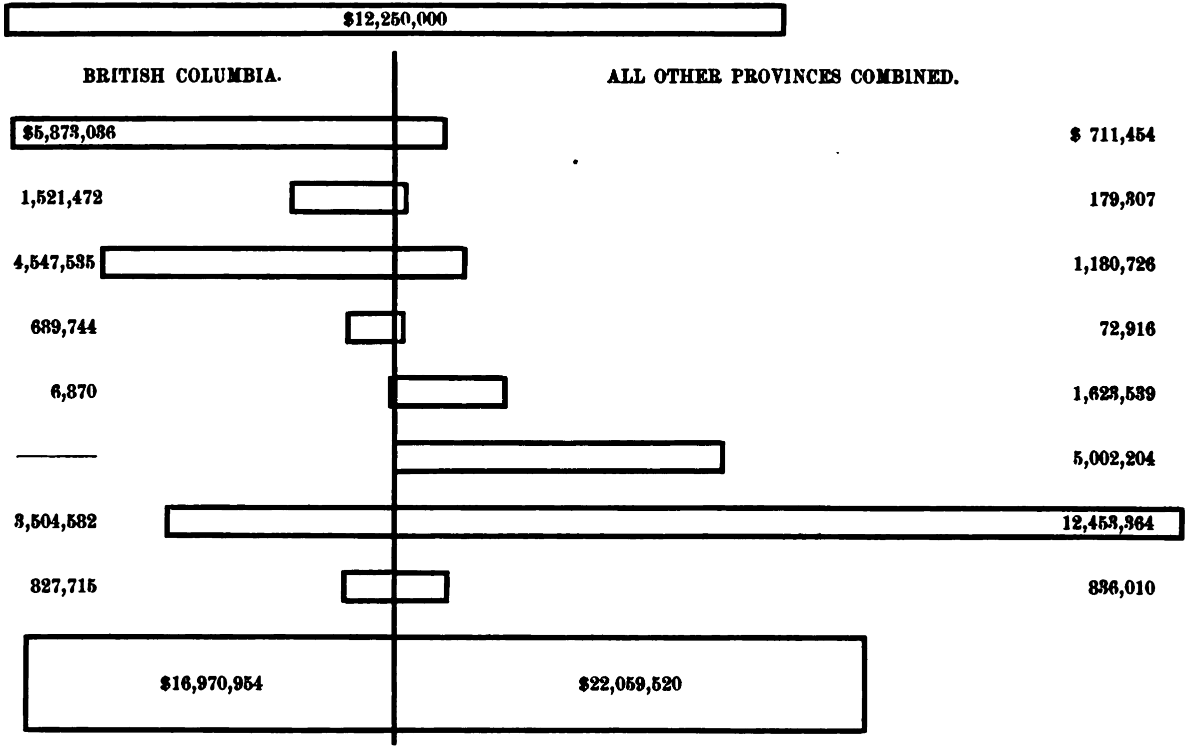


TABLE X.

Showing Comparative Mineral Production for 1903 of British Columbia and Other Provinces of the Dominion.

	Dominion Total.	YUKON TERRITORY.	
Gold	....	$12,250,000	
		BRITISH COLUMBIA.	**ALL OTHER PROVINCES COMBINED.**
Gold	$6,584,490	$5,873,036	$ 711,454
Silver	1,700,779	1,521,472	179,307
Copper	5,728,261	4,547,535	1,180,726
Lead	762,660	689,744	72,916
Iron	1,630,409	6,870	1,623,539
Nickel	5,002,204	———	5,002,204
Coal	15,957,946	3,504,582	12,453,364
Coke	1,663,725	827,715	836,010
Total	....	$16,970,954	$22,059,520



PROGRESS OF MINING.

The statistics of the mineral production for the year 1903, when compared with those of the previous year, do not show that increase of output which had been hoped for, and which there was reason to expect.

The gross value of the mineral products of the Province for the year 1903 was $17,495,954, an increase over the preceding year of $9,404; not a very great sum, but still an increase, and including and overcoming the decrease occurring in both the placer gold and coal mining branches of the industry, for which in both cases there are special and, fortunately, only temporary causes.

These statistics are only a record of the amount of mineral actually produced and marketed; as such they are true, but it is felt they are not quite a just measure of the progress actually made in the industry, as they take no cognizance of the improved methods of mining and treatment which have been or are being adopted, and which have so important a bearing on the chief end and object of mining, viz.:—the earning of a profit.

It is generally conceded that mining in the Province is gradually assuming a better and more secure position as a business than it formerly held, and is on a more stable basis than it was a year ago.

This has been secured by the general recognition of the necessity for, and the adoption by many companies of methods more conducive to success, while others have passed through that initial and expensive experimental stage which seems inherent to mining in a new district.

This viewing of mining from a more strictly business standpoint is gradually tending to the elimination of enterprises which were not based upon substantial merit, and which, therefore, could never succeed, but, by their very existence, cast a shadow of doubt upon legitimate enterprises.

The labour conditions too, formerly unsettled, appear now to be more stable, experience having apparently taught both employer and employee that strikes and lockouts are expensive luxuries not to be hastily indulged in, entailing not only a present but subsequent loss to both parties.

The following is a brief review of the separate branches of the industry:—

With regard to coal mining, the collieries of the Province, taken collectively, did not produce as much coal in 1903 as in the previous year. The Crow's Nest Collieries show a substantial increase both in the production of coal and coke, while the Coast Collieries show a more than equivalent decrease. The output in both these districts was greatly diminished by strikes which occurred during the earlier part of the year, causing a loss of time which could not be made up, while in the Coast district a change of ownership of one of the large properties led to alteration of plans and plant, which temporarily interfered with, although they will eventually increase, the output. There is also no doubt but that the Coast Collieries are feeling the competition in California of the fuel oil found there, since in that market a large percentage of the Vancouver Island coal has of late years been sold.

Placer gold mining has, on the whole, about held its own during the past year; there has been a decrease, but only a slight one. The northern districts have made an increased output, but the central districts show a diminished production. Of these latter districts, Cariboo requires a heavy snow and rainfall to insure success, while the valley of the Lower Fraser requires low water in the rivers to expose the bars. Unfortunately, during this past season, these conditions were exactly reversed and the output of gold accordingly diminished.

The tonnage of ore mined by the lode mines of the Province in 1903 was 1,286,176 tons, an increase over the preceding year of 287,177 tons, or about 29 %. In certain districts, more particularly those producing lead ores, there has been a decrease, but the Boundary, Rossland and Coast districts all show large increases in tonnage of ore mined. In the Boundary district the continually improving methods of smelting and mining have rendered further low grade properties workable. These new methods are gradually widening the margin of profit in the handling of the large but notoriously low grade ore bodies of that locality.

In the Rossland district the ore mined amounted to 360,786 tons, an increase over the preceding year of 31,252 tons, or about 9½ %. The metallic contents of the output has scarcely kept pace with the increased tonnage, as the average grade of the ore mined in the camp was lower than ever before. This gradually decreasing assay value of the ore is attributable to two causes, both of which are unquestionably true, although it is difficult to know exactly the relative importance to assign to either. One of these causes is the undoubted fact that the cheaper methods of mining and of treatment charges which have followed year by year have rendered possible and advisable the handling of a lower grade ore than formerly, admitting of the utilisation of much material as ore which previously was waste. On the other hand, it is claimed that, as the ore is followed to a depth, it is actually of a lower grade, or rather that there is a smaller percentage of high grade ore in the ore body. On this point it might not be inappropriate to quote from the last annual report of the Manager of the Centre Star and War Eagle mines (two of the largest mines in the camp), who has had ample opportunity to observe the facts. He says:—

"Developments up to date show that the Centre Star Mine" (he says the same of the War Eagle) "has experienced the same general change in the character of its ore deposits which has occurred in all other productive mines in the Rossland District, and which is the general rule throughout the mining districts of the world. This is the transition from the occurrence of high grade bonanza ore bodies, capable of profit under the expensive process of smelting, to masses of lower grade requiring a treatment by milling."

This Centre Star report goes on to say that for the Company's fiscal year ending September 30th, 1903, the ore sales amounted to 88,387 tons, with an average assay contents of gold, .50 oz.; silver, 0.40 oz.; copper, 0.99 %, in which ore "the net profit in excess of all expenditures was $228,358.90."

The report of the War Eagle mine shows that for its fiscal year the ore sales have been 60,039 tons, the average assay contents of which were, gold, 0.418 oz.; silver, 1.02 oz.; copper, 1.45 %, having a smelter gross value of $9.87 per ton. The excess of revenue over expenditure was $68,512.21, of which $38,171.74 was charged off to depreciation, leaving $30,340.47 as net profit for the year.

These figures indicate that the ore has certainly not as yet reached a limit in grade so low as to be unworkable by even the present methods, although the Manager is possibly right in anticipating the transition to which he refers.

The Coast mines are rapidly assuming an importance as a factor in the production of the Province which they never before occupied, there having been mined and treated some 103,524 tons of ore, nearly four times as much as formerly, an increase which is due almost entirely to mines in the Mt. Sicker district of Vancouver Island.

OTTER CREEK HYDRAULIC MINE, ATLIN—GENERAL VIEW.

OTTER CREEK HYDRAULIC MINE—SHOWING PIT.

The following table shows the amount of ore mined in the Province during the past year, together with the number of shipping mines, the ore shipped and the men employed in each district:—

TABLE SHOWING DISTRIBUTION OF SHIPPING MINES IN 1903.

	Tons of Ore Shipped.	No. of Mines Shipping.	No. of Mines Shipped over 100 tons in 1903.	MEN EMPLOYED IN THESE MINES.		
				Below.	Above.	Total.
CASSIAR:						
Skeena	67	1	....	8	12	20
EAST KOOTENAY:						
Fort Steele	938	2	2	27	24	51
Windermere	806	4	1	45	17	62
WEST KOOTENAY:						
Ainsworth	24,332	9	2	77	26	103
Nelson	76,923	14	10	217	112	329
Slocan	12,412	39	17	378	172	550
Trail	360,786	13	11	....	....	....
Other Divisions	5,430	11	6	137	54	191
LILLOOET	3,652	2	2	7	8	15
YALE:						
Boundary	697,284	20	16	436	378	814
ASHCROFT-KAMLOOPS	22	1	....	9	10	19
COAST	103,524	9	7	190	132	322
Total	1,286,176	125	74	1,531	945	2,476

It will be seen from this that the number of mines shipping over 100 tons is one less than in 1902. Of the non-shipping mines the statistics are very incomplete, as few of them report to the Department and most have no representatives who can be found to give details as to the number of men employed, etc. Returns have, however, been secured from 40 non-shipping mines, and these employed a total of 274 men; 143 above ground and 131 below ground.

The statistics of the actual production of mineral are to be found in the preceding tables, which may be summarised as follows:—

Table I. gives a summary of the total values of the mineral products of the Province to the end of 1903. From this it will be seen that the mines produced a total valuation of $207,224,492; of this total $92,550,451 was derived from gold, $63,321.869 was obtained from coal, and $19,997,354 from silver, with copper and lead following next in order of importance.

Table II. shows the value produced in each year and indicates a steadily increasing output year after year. In 1903 the value of the mineral production of the Province amounted to $17,495,954, a not inconsiderable annual contribution to the material wealth of the world.

Table III. gives in detail the amount and values of the various mineral products which go to make up the total production. As will be seen, gold still retains its place as the prime factor in our output, with a valuation for 1903 of $5,873,036, and copper has the second place, with a production valued at $4,547,535.

Table IV. shows the values of the mineral products of the several districts of British Columbia. West Kootenay District is still the most important from the point of view of production, but the table shows the gradually growing importance of the Boundary and the Coast districts, the latter being largely assisted by the output of the coal mines therein and by the mineral products which enter into the building construction of the two largest cities of the Province.

Table V. gives the production of the placer gold mining branch of the industry, and shows that the yield of the placer gold mines of the Province for each year up to 1903 amounted in all to $65,688,103, of which there was produced during the year 1903 $1,060,420.

Table VI. deals exclusively with the production of the lode mines of the Province, which have made an output of mineral to the total value of $74,800,721, of which there were produced in 1903 some $11,571,367.

It will be noted that the total gross production of the lode mines of the Province now exceeds the amount produced by the placer mines since and including the earliest Cariboo times, when this country first entered the arena as a mineral-producing district.

Table VII. gives the details of production of all metalliferous mines (not including coal), showing the amount and values of each metal produced and the districts from which it was obtained.

Table VIII. refers to the coal mines and their products, and gives the amount and values of their output from the earliest days to date. The gross valuation of the production is $63,321,869, of which $60,349,694 was sold as coal, and $2,972,175 as coke.

Tables IX. and X. are graphical comparisons of the values of the products of the British Columbia mines for the years 1902 and 1903, as compared with those of all the other Provinces of the Dominion of Canada, and substantiate the claim of British Columbia to be considered the Mineral Province of Canada.

COAL.

As regards production, the coal mines of the Province, as a whole, about held their own during the past year. There were mined in 1903, 1,450,663 tons of coal, and of this total output 1,168,194 tons were sold as coal, while 282,469 tons were converted into coke, of which latter there were produced 165,543 tons. This represents, as compared with the production of 1902, a decrease of about 16 % in the quantity of coal sold, and an increase of about 29.3 % in the amount of coke produced.

As has been pointed out in previous Reports, the conditions surrounding the coal mining industry in the two extremes of the Province differ so materially that the districts must be considered separately. The coal mines of Vancouver Island were, until within the last five years, the only producers in the Province, and to-day make an output of slightly over half the coal mined These collieries made a gross production in 1903 of 860,775 tons, of which there were sold as coal 827,857 tons, while, from the remainder, 15,779 tons of coke were produced. This represents a reduction in net production of coal of 346,036 tons, equivalent to about 29½ %, and of coke a decrease of 4,399 tons or 22 %.

In 1902 there were 673,524 tons, or about 75 %, of the coal produced by the Vancouver Island Collieries sold in California. As has been previously pointed out, the market of this State has been invaded by local fuel in the form of oil, and this has, at least temporarily lessened the demand for coal, so that in 1903 only 400,713 tons were shipped from Vancouver Island, representing only 45.2 % of the total product from these collieries.

The local market has, however, been able to consume 42,400 tons more coal this year than last, an indication of increasing home industries, which is further borne out by the fact that in 1902 the Vancouver Island Collieries sold for consumption in British Columbia 4,000 tons of coke and exported 12,000 tons, while this year the total production of 15,779 tons was consumed at home, as well as 3,719 tons taken from the stock on hand.

The collieries at Nanaimo, formerly operated by the New Vancouver Coal Company (an English Syndicate), have been taken over by the Western Fuel Company (a California Company), and this will probably stimulate the California trade.

The Crow's Nest Collieries, during the year 1903, mined 589,888 tons of coal, of which 340,337 tons were sold as such, and 249,511 tons were converted into coke, producing 149,764 tons of that commodity.

This gross output of coal is 195,927 tons in excess of the production of the previous year and represents an increase of nearly 50 %. This increase was made despite the fact that the Coal Creek mines had not recovered from the explosion of 1902 and that the equipments at the other collieries are as yet incomplete or temporary. It is safe to predict, therefore, that next year the output will show a like increase.

The market for this coal, which is entirely in the interior, both in Canada and the United States, seems to be unlimited, as in quality the coal is the best to be had in this section of the continent.

The production of coke at the Crow's Nest Collieries is 41,927 tons in excess of last year's product, a 38.8 % increase. The exports have been practically the same as last year, but the consumption in British Columbia has been increased by 40,933 tons, or is 50 % greater than last year.

Inasmuch as the consumption of coke is approximately a measure of the tonnage of ore smelted, this increase in the home consumption of coke is an index of the increased amount of ore so treated in the interior of the Province. That the coke exports have not increased is due wholly to the fact that there was no further surplus to ship, the oven capacity being taxed to the uttermost. Additional ovens have been constructed this past summer, which should increase the capacity about 25 %.

The following table indicates the markets in which the coal and coke output of the Province was sold:—

COAL.		Coast.	Crow's Nest Pass.	Total.
Sold for consumption in Canada	(Tons—2,240 lbs.)	353,166	173,949	527,114
″ export to United States	″	400,713	146,010	546,723
″ ″ other countries	″	2,725	....	2,725
COKE.				
Sold for consumption in Canada	″	19,498	122,006	141,504
″ export to United States	″	....	27,758	27,758
″ ″ other countries	″	....	....	....

GOLD.

Placer Gold.

The placer gold production of the Province for the year 1903 was $1,060,420, a decrease of about $12,720 or 1 % from the year 1902, but still showing an increase over 1901 of $90,320. The Atlin and Liard Divisions of Cassiar are the only districts which this year show an increased production of placer gold. In the former Division the increase has been obtained chiefly from the working by improved methods, and on a larger scale, of an old high channel found in the benches of Pine and Spruce Creeks. The productive work in this district is still largely in the hands of individual miners or small partnerships of such, as is indicated in the report of the Gold Commissioner of the District, who says that about 75 % of the royalty has been paid by "individuals," and only 25 % by companies.

Such has been the condition thus far, but it will probably not remain so for another year, as a large number of the smaller individual enterprises, which have successfully proved their ground, have been acquired by companies and consolidated; these properties are being equipped with plants which should materially increase the output, while at the same time, by reducing the cost of handling material, they should render available much ground now lying dormant. Next year should see these companies in full operation, working on a larger scale ground already tested, and it seems probable, therefore, that the increased production of the past year will be followed by a much greater increase in 1904.

The increase in the Liard Division has been due to the operations of the Thibert Creek Hydraulic Company, which have been comparatively successful; comparatively so, because the Company is now only opening up its pits and water supplies, and should in future be able to do much better. The operations of this Company seem to have stimulated other hydraulic enterprises in the district, for at least two other companies have preparations well under way and within two years should also be producing gold, despite the remoteness of the camp and the difficulties of transportation.

Cariboo District, as a whole, shows a drop in production of about $65,000. In the Cariboo Mining Division (Barkerville) the production has been slightly diminished as compared with 1902, but still shows a decided increase over other recent years. The output here is almost entirely due to small hydraulic concerns held by individuals or partnerships. The large companies, of which there are several, have not as yet arrived at a productive stage.

In the Quesnel Division there has also been a decreased output. Here the individual miners have done well and have maintained their proportion of the output, but the hydraulic mining companies have had a poor season, owing to the shortage of water caused by the light snow fall during the winter of 1902-3.

In the section drained by the Lower Fraser river, where placer gold mining is carried on on the bars and flats rendered available only at low water, there has been trouble this past season owing to the heavy rains in the summer, which filled the streams again, so that there was little or no "low water," and consequently a decreased output of gold.

Hydraulic Gold Mining.

Hydraulicing on a small scale in both Atlin and Cariboo has, as already stated, been fairly successful, but the few large companies operating have had a rather disastrous year. Among these the Consolidated Cariboo Company was so short of water that it could only run 53 days during the season, and the output was only little more than half that of the previous year. Hydraulic mining is so absolutely dependent on a supply of water available when required, that the necessity of being independent of the season's weather conditions is becoming apparent, and the prime requisite of a hydraulic plant is seen to be a storage capacity or drainage area sufficient to be able to average the supply of one year with another, where an insufficient minimum supply only is obtainable.

The auriferous black sand deposits of the Coast of Vancouver Island remain still unworked, despite the promising returns therefrom during 1901.

Dredging for Gold.

Dredging for gold has not as yet, in British Columbia, proved a commercial success; a number of serious attempts have been made with one or another style of dredge, each with the idea of moving a greater quantity of dirt rather than improving the methods for saving the gold dredged up. It was pointed out in last year's Report that but a fraction of the gold dredged up was saved, to which fact, rather than to the scarcity of gold, most of the failures are attributable. The continued efforts of the dredging companies prove their confidence in the presence of the gold in the river beds, and their belief that it can be raised and saved.

A new dredge has been constructed in Atlin (cuts of which are given in this report), in which the gold-saving appliances are on a separate scow and are much more complete than anything yet attempted in the Province; the result of the working of this apparatus during 1904 may prove instructive.

In New Zealand particular attention has been directed during the past few years to the saving of fine, flaky gold, such as we have to contend with in our own dredging propositions. The last Report of the Department of Mines of that Colony (1902), recently received, contains some valuable suggestions and cuts regarding the design and arrangement of gold-saving tables, having more particular reference to the proper and even distribution of the sand upon such tables, all of which might well be studied by our dredge masters, and could probably be applied in connection with under-currents in many of our hydraulic mines. Some of these cuts will be reproduced in this Report.

Lode Gold Mining.

The production of gold from lode mines has this past year amounted to $4,812,616, a decrease of 1½ % as compared with that of 1902. There has been a serious falling off in the production of the Rossland and Nelson Districts, which has, however, been met by a corresponding increase in the Coast, Boundary and the Trout Lake and Lardeau Districts.

In the Nelson District the tonnage of ore mined has been about the same, but the assay value of the ore has been materially lower.

In the Rossland District the tonnage has increased about 9½ %, but the gold production has decreased about 10 %.

In the Boundary District the tonnage of ore treated has increased about 34 %, and the gold produced nearly 20 %, indicating that ores of a lower gold assay value have been treated, a reduction which it is calculated, however, has been more than met by cheaper methods of treatment and mining.

The Coast District has produced nearly three times as much gold as in the previous year, chiefly due to the output of Mount Sicker properties.

The Trout Lake and Lardeau Districts have each made increases in lode gold output which, while not as yet forming any great percentage of the total output of the Province, are still very good beginnings, and there is a belief that these sections of the Province are only at the commencement of their productiveness.

In the Rossland, the Boundary and the Coast Districts the gold is recovered chiefly by smelting from ores associated with copper, while in the Nelson and Lillooet and the Trout Lake and Lardeau Districts it is derived from stamp milling.

The lode gold has been derived approximately as follows:—

From direct smelting of copper gold ores	$4,327,206
From combined amalgamation and concentration	485,410
Total	$4,812,616

SILVER AND LEAD.

In British Columbia these two metals must be considered together, for, even in the present depressed condition of the market, about 70 % of our silver output is derived from silver-lead ores. The total output of silver for the past year has amounted to 2,996,204 ounces, valued at $1,521,472. Of this amount about 2,103,000 ounces, valued at $1,067,903, was found associated with lead.

In the Fort Steele Mining Division less than 1,000 tons of lead ore were mined in 1903, as compared with 87,000 tons in 1900.

In the Slocan Mining Division only about half the usual tonnage of ore was produced.

Ainsworth Mining Division mined much more ore than formerly and produced 30 % more lead than usual, which was, however, the result of the concentration of a very low grade ore of the Highland Mine.

Silver-lead mining in British Columbia, except for those ores carrying high silver values, has been at a very low ebb for the past two years; in fact, most of the lead mines carrying low silver values suspended operations, the owners claiming they could not be worked at a profit under existing circumstances.

Strong representations were made to the Dominion Government of these facts, and application made for a bounty on lead mined in Canada. This application was granted at the last session of the Dominion Parliament. The following is the bounty awarded:—

An Act to provide for the payment of Bounties on Lead contained in Lead-bearing Ores mined in Canada.

[24th October, 1903.]

1. The Governor in Council may authorise the payment of a bounty of 75 cents per 100 lbs. of lead contained in lead-bearing ores mined in Canada, such bounty to be paid to the producer or vendor of such ores: Provided that the sum to be paid as such bounty shall not exceed $500,000 in any fiscal year: Provided, also, that when it appears, to the satisfaction of the Minister charged with the administration of this Act, that the standard price of pig lead in London, Eng., exceeds £12 10*s*. sterling per ton of 2,240 lbs., such bounty shall be reduced by the amount of such excess.

2. (1.) Payment of the said bounty may be made from time to time to the extent of 60 % upon smelter returns showing that the ore has been delivered for smelting at a smelter in Canada. The remaining 40 % may be paid at the close of the fiscal year, upon evidence that all such ore has been smelted in Canada.

(2.) If at the close of any year it appears that during the year the quantity of lead produced, on which the bounty is authorised, exceeds 33,333 tons of 2,000 lbs., the rate of bounty shall be reduced to such sum as will bring the payments for the year within the limit mentioned in section 1.

3. If at any time it appears, to the satisfaction of the Governor in Council, that the charges for transportation and treatment of lead ores in Canada are excessive, or that there is any discrimination which prevents the smelting of such ores in Canada on fair and reasonable terms, the Governor in Council may authorise the payment of bounty, at such reduced rate as he deems just, on the lead contained in such ores mined in Canada and exported for treatment abroad.

4. If at any time it appears, to the satisfaction of the Governor in Council, that products of lead are manufactured in Canada direct from lead ores mined in Canada without the intervention of the smelting process, the Governor in Council may make such provisions as he deems equitable to extend the benefits of this Act to the producers of such ores.

5. The said bounties shall cease and determine on the 30th June, 1908.

6. The Governor in Council may make regulations for carrying out the intention of this Act.

7. Chapter 8 of the Statutes of 1901, intituled "An Act to provide for the payment of bounties on lead refined in Canada," is repealed.

This means, on a 30 % ore, a direct bounty of $4.50 per ton of ore mined, a fairly good profit in itself, which should revive any lead mine and enable it eventually to work unassisted when the bounty expires.

The anticipation of such bounty retarded, for the time being, immediate production, for the belief was prevalent that it would only apply to ores mined after the passing of the Act. When the bounty became an assured fact, it was too late in the season to admit of opening up and developing the various properties in time to make any materially increased production in 1903. The effect this year was rather to stimulate development and equipment, the results of which should be apparent next season.

The lead production of the Province for 1903 was 18,089,283 lbs., valued at $689,744, the lowest it has been for seven years.

COPPER.

The copper ores being mined in British Columbia are very low grade in copper, but, fortunately, contain values in gold or silver, without which they could not be profitably worked.

The total output for the year, and the highest yet made by British Columbia, was 34,359,921 lbs., valued at $4,547,535, which was produced in the following Districts:—

Boundary District	18,485,542 lbs.
Rossland "	8,652,127 "
Coast "	6,861,171 "
Nelson "	346,218 "
Various other Districts	14,863 "
	34,359,921 "

In the Rossland camp the ores average about 1.2% copper, and in the Boundary about 1.5%, while on the Coast they averaged 3½% copper.

OTHER MINERALS.

Iron Ore.

Very little iron ore has been mined in the Province this past year. The consumption of iron ore as flux was practically nothing, as the lead smelters have required little, and this little they were able to obtain carrying copper or gold values sufficient to at least assist with the cost of mining.

Zinc.

Zinc has scarcely, as yet, become a factor in the mineral output of the Province. Some of the Slocan mines containing zinc as an impurity in their galena have sorted out a certain amount of ore higher in the former and sold it as zinc ore to certain smelters in the United States. Attempts are being made to make a cleaner separation, which, when successful, will enable these zinc ores to be marketed to better advantage.

Platinum Group of Metals.

There is no record of any platinum having been produced this last year in the Similkameen District, where it has formerly been obtained as a by-product in placer mining. Reports are current that platinum in place has been found in the Boundary District, but it has been impossible to get any of the ore to confirm such occurrence by assay in the Government Assay Office. In the Thibert Creek Hydraulic Mines platinum is known to be present, and its occurrence has been mentioned in former issues of this Report. None has been saved this year, as undercurrents were not employed.

It may be worthy of mention that a small sample of gold from near Dawson, Yukon Territory, tested in the Provincial Government Assay Office, yielded 390 milligrams of osmiridium to one ounce of gold.

Tin.

The finding of tin near Barkerville, mentioned in last year's Report, has been further investigated and proves to have been misleading, the metal having apparently been melted off cans by a fire.

Building Materials.

The mineral products entering into building construction include brick—both red and fire—cement, lime, stone, drainpipes, tile, etc. As yet many of these materials are produced only in a small way in the localities where they are to be used, and difficulty has been found in obtaining reliable figures. Those given are approximate estimates, as carefully made as has been possible.

Oil Shales. Oil-bearing shales have been discovered in the vicinity of Harper's Camp, in the Cariboo District, and will, it is understood, be more thoroughly investigated this coming season. From present indications there appears to be a large deposit of these shales, and, as far as can be determined at present, they do not appear to get their oil from any seepage from below. A sample of the shale tested in the Government Assay Office at Victoria, yielded $\frac{6}{10}$ of 1 % by weight of a dark, heavy oil, and about 4.8 % water. The oil so obtained by retorting the shale appeared to begin to distil over at from 130° to 140° Centigrade, or from 266° to 284° Fahrenheit, and had a specific gravity of 0.95. It might be here noted that California crude oil has an average specific gravity of about .94, while the oils from East Kootenay have a specific gravity of from .82 to .83. This shale oil is inflammable and has a strong petroleum odour.

As was noted in last year's Report, coal has been discovered a few miles further up Horsefly river, to the east of Harper's Camp, but, as far as can be learned, no further work has been done here.

Well authenticated reports are received of the discovery of coal to the east of Quesnel lake, which will be more thoroughly investigated during the coming season.

The occurrences of oil in the Fort Steele Mining Division were visited by the Provincial Mineralogist during the year and are described in the body of this Report.

GENERAL DEVELOPMENTS OF THE YEAR.

Perhaps the most noteworthy feature of the development work of the past year, and the one thing which promises more than any other to promote the well-being of the mining industry, has been a general recognition of the fact that the margin of profit, as a rule, lies in the large masses of low grade material which occur sometimes alone and sometimes associated with ore which, by comparison, might be called "bonanza." As included in this term "low grade material," might be taken certain by-products which heretofore have not been a source of revenue. With the general recognition of this fact came rational attempts to remedy the difficulties in the way of mining and treating these low grade ores at a profit. These attempts, in many instances, have as yet only progressed as far as the experimental stage, but, in several cases, with fair prospects of ultimate success.

In the Boundary District matters are most advanced in this respect. The smelting in that vicinity of very low grade ores must be considered as merely a "concentration" by a fusion method, which is considered the most applicable to such ores. This has been accomplished with most modern plants, the ore being taken from several mines and, by a judicious admixture of other ores as fluxes, the latter carrying values but not sufficient to be treated independently, concentration on a large scale has been possible, with a reduction in the costs of smelting greater than had at first been hoped for.

With this cheaper cost of fire concentration, less discrimination had to be used in the mining of the great bodies of ore, much of which latter was of an assay value very near the line dividing profit from loss. As less discrimination had to be used in selecting the portions of the ore bodies to be mined, cheaper mining resulted, and it became possible to use steam shovels, together with power transportation in and about the mines and a number of other economies. In these respects the Granby Co. has probably been in the lead, and has not by any means reached its limit, but seems to have been so far successful, inasmuch as the company has this year declared a dividend.

Other companies in the Boundary District owning mines the ores of which, from a smelting point of view, may be described as complementary one of the other, have arranged an amalgamation which should convert two profitless companies into one profitable one.

In the Rossland Camp, while much has been done towards lessening the costs of smelting, it has been recognised that certain of the constituents of the ore placed a limit upon the economies to be made in that direction, and hence steps have been taken to eliminate these constituents, so that not only might smelting be done more cheaply, but also on ore in more concentrated form. Among the methods referred to are included a water concentration, or separation of certain portions of the ore, and a separation by oil of certain values more effectually to be recovered with this medium. So far the experiments made—for the plants are only so considered, although on a large scale—have given promise of satisfactory results. The Rossland Power Co. has a mill practically completed, situated between Rossland and Trail, at which it is expected to concentrate ores from the Centre Star and War Eagle mines.

A small mill has been erected near Nelson for experimentation with a "grease" process, of which Messrs. H. E. T. Haultain and H. B. Stovel are the patentees. The details of the process are not as yet made public, but it may be said that the ore pulp flows over an endless belt covered with vaseline, which retains certain minerals, according to angle of adjustment, flow of pulp, washwater, etc.

Experimental tests have been made which lead to the belief that much of the zinc, which now is regarded as merely a contamination of the lead ores of the Slocan, may be separated by a magnetic process and rendered available as an ore of zinc.

An experimental "Wetherell Separator" has been installed in the Province, with which many ores have been tested, while other British Columbia ores have been sent East for experimentation. Magnetic concentration is as yet in its infancy, and from experiments which the writer has had the pleasure of recently witnessing when in the East, he is convinced of the wonderful possibilities of the process as applied to a number of British Columbia ores, the concentration of which by any water method was impossible.

That certain strongly magnetic minerals were separable by magnetic concentration is a fact so well known as scarcely to need comment, but that many minerals which are not acted upon by an ordinary magnet may be eliminated by higher magnetic powers is not so fully realised and is worthy the serious consideration of mine owners. To quote from Ingall's "Production and Properties of Zinc" (p. 268):—"It has been shown by Farady, Plucker, Wiedeman and others that magnetism is an inherent property of all substances, which are either attracted or repelled by the poles of a magnet, though in most substances the manifestation of this property is exceedingly feeble."

At the works of the Wetherell Separator Co., at Newark, N. J., the writer saw certain samples of zinc blende magnetically "picked up" out of a mixture of gangue, galena, pyrite, etc., making a clean separation, while a similar separation of tetrahedrite (gray copper) was made from gangue and pyrite.

Upon inquiry as to what minerals had been found separable by the process, it was said that no rule could be laid down, but that each special ore required to be determined by experiment, since, for example, of two samples of zinc blende, one could be easily attracted by the magnet of high power, while the other sample was so feebly attracted as to preclude any practical separation; similarly with tetrahedrite, although the sample of this mineral experimented upon, an ore from British Columbia, was strongly magnetic. This lack of uniformity is accounted for by the fact that in few ores does the mineral conform strictly to its theoretic composition, but contains usually associated minerals which materially affect the magnetic action. Certain minerals which naturally are practically non-magnetic may be rendered so by a partial or complete roasting.

In the Atlin District the past year has been a very successful one, both as regards the production of the season and the prospects of the future. The old higher channel on Pine and Spruce creeks has been further worked with satisfactory results. This channel has been drifted upon for some distance from either of the creeks mentioned and proved to extend well under the gravel hill between them. It provides winter work at drifting for a number of men, and is also the basis of a number of hydraulic operations now under way. Dredging enterprises have also been started here and one very completely equipped dredging plant has been installed; it was, however, completed too late in the season to begin operations in 1903.

The Bennett and Chilkat Mining Divisions have been done away with and this territory included in that of the Atlin Division. No new developments are recorded.

Samples of coal have been received from the Atlin District and, upon examination, proved to be a good lignitic coal, such as might prove of value for steam or heating purposes.

No new developments have been recorded in the Teslin Division. There are reports of successful prospecting, but no producing placer mines have as yet been heard of. The same may be said of the Stikine Division.

In the Liard Division of Cassiar District the year has been successful for the one hydraulic company as yet operating, while the certainty of other companies putting in plants is assured, so that there is every prospect of the old Thibert Creek District, so well known as a placer mining camp in the 60's, again becoming a producer of gold, though now by modern hydraulic methods.

In the Skeena Division there has been the usual prospecting development going on, but there is nothing of especial interest to record. On Lorne creek hydraulic operations were carried on by one company, and it is said that two others are being organised and will shortly commence work. The defining of the Alaska-Canada boundary line will help the district, for there are a number of promising properties located near such line, and the uncertainty as to which country they were in has had a retarding influence on their development.

On the Princess Royal island properties some 20 men have been employed and some small shipments of rich copper-gold ore have been made.

Nothing has been heard this year of the operations on Bornite mountain on the Skeena river, nor have any shipments been made from the sulphur properties on the Ecstall river.

There have been a great many inquiries as to coal lands on the Queen Charlotte islands, and it is reported that there is a probability of boring operations being started there this coming summer to determine the position and character of the beds on the more undisturbed lands at some distance from the outcrops. No attempt has been made to prove the extent or value of the so-called "mineral tar deposits" on these islands, which have been already referred to in previous Reports (1901).

Several copper prospects have been located on the southern portions of these islands, and have a development sufficiently promising to have induced several engineers to go and examine them, although no serious work has as yet been done.

On Texada island the smelter has not been in blast. The Cornell and Copper Queen mines have been under bond to persons who are prospecting these properties but shipping little. A surface tramway has been built from the mines to the dock, together with other similar improvements. The Marble Bay mine has also built a surface tramway; this property has shipped ore both from the mine and from the second class dump, which latter was sold to the Crofton smelter as flux at a flat rate per ton. The *Loyal Group*, a little to the north of the last mentioned, has been further developed and has made small shipments.

On the West Coast of Vancouver Island there are no new developments to report on the iron properties of Barkley Sound. The recent death by drowning on the SS. Clallam of Mr. Homer Swaney, the most enthusiastic and energetic of the advocates of these occurrences of iron ore, is a great loss to these properties and must retard their development.

The copper mines of this vicinity, the Nahmint and Monitor, have lain idle with only a watchman in charge

On Quatsino sound the copper properties have not proved, on development, to be as high grade as had been hoped, but, nevertheless, made shipments of between 2,000 and 3,000 tons of ore to the Crofton smelter. Near the south arm of this inlet a very promising exposure of nearly pure zinc blende has been discovered, which will be found described in the body of this Report.

At Sidney inlet the *Prince Group* has been Crown-granted; good showings of copper ore have been developed, but the property has lain dormant the past year. On the *Indian Chief Group*, the Dewdney Syndicate's property, development work has been continued, it is reported, with satisfactory results.

The most satisfactory developments of the year in the Coast District have been at Mount Sicker, on Vancouver Island. Here the Tyee Mining Co., which started active operations about the beginning of 1903, has, during the year, produced and sold mineral containing values amounting to over half a million dollars. The Lenora mine, which has shipped for some years, has been in litigation; this has retarded work somewhat, but the property has still managed to make shipments about as usual. The *Richard III.*, lying just above the *Tyee*, has been most satisfactorily developed from a promising prospect into a producing mine. Extensions of the *Tyee* ore bodies have been proven in this property. Other properties in the vicinity have been under development, with encouraging results, but as yet have not passed out of the prospecting stage.

The importance of the Coast District as a copper producer is being realised, about 20% of the output of the Province for the past year having been derived from here.

Of the New Westminster Mining Division there is nothing special to report. The Howe sound copper properties, previously described, have been dormant. Development has been done on a number of claims and a find of very pure zinc blende is reported, from which fine samples have been obtained, but, so far as can be learned, the extent of the deposit has not been determined.

In the East Kootenay District there has been a good deal of successful prospecting going on in the Windermere Division, and considerable bodies of lead ore have been developed which are described in the report on that section.

In the Fort Steele Division the lead mines have been practically all shut down, but, stimulated by the "lead bounty," preparations are being made to renew operations, which had, however, not been commenced at the close of the year. In this Division the coal mines are the important factor in mining; of these the producing mines speak for themselves by their actual output, which is noticed elsewhere.

As to development of new properties, the Crow's Nest Pass Coal Company has opened a number of previously undeveloped seams of coal and has done a commensurate amount of construction work, which has created very little comment, as the Company already had opened up and was operating such extensive deposits; yet these new developments of this Company alone are sufficient to constitute a large coal mining centre. In this particular coal field the Dominion Government has made its selection of the large area of coal lands which it had reserved to be selected from the lands to be turned over to the B. C. Southern Railway.

Prospecting for coal lands further to the north has resulted in the discovery of a number of important deposits of coal, both in and without the land granted to the B. C. Southern Railway. Of these latter locations, important and probably valuable deposits have been developed on the North Fork of Michel creek, and on the Upper Elk river and its tributary, Fording river. The development has progressed so far as to prove that there are beds of good workable coal, which have yet to be further proven as to extent and the many other features which are essential to the commercial production of this commodity.

In the Nelson Division the most important mine, the Ymir, has maintained its usual tonnage, but the values per ton have materially diminished, the workings at present being apparently in a lower grade zone. Several other "free milling" properties in this vicinity have been under development, but have not as yet been equipped or opened out.

The Silver King mine (Hall Mines Co.) is still being worked under lease, and is producing on a comparatively small scale. As far as can be learned, no new extensive bodies of rich ore have been developed.

One of the most interesting developments in this section is that of the *Hunter V.*, the ore from which is limestone carrying good gold and silver values.

In the Rossland camp the yearly increase in tonnage has again been made by the big mines, and is noted elsewhere, as is also the fact that these properties are making serious and apparently successful efforts tending to the utilisation of the ores too low grade to admit of smelting direct.

Other new properties have been opened up, encouraged by lower rates of treatment now obtainable, and there is a strong probability that by next year this camp will have one or two additional producing mines of importance.

In the Giant mine, molybdenum in considerable quantity has been found in the ore, attempts to save which have been made, but with what practical results has not yet been learned.

The Boundary has again been the centre of interest with its increasing tonnage of ore, mined largely from open quarries, loaded by steam shovels and smelted on a very large scale in equally large furnaces, and at a cost which will bear comparison with similar work anywhere. The rise in the market price of copper during the year, approximately 1.62 cents per pound, or equal to an increase of 14 %, has done much for this District, making probably just the difference between a profit and a loss.

At Camp McKinney, the Cariboo McKinney Co. mined and milled about 15,000 tons of ore, quartz carrying free gold, having a gross assay value of $5.50 per ton. The development of this property, however, has not of late been such as to give encouragement; consequently, at the last annual meeting of the company, on the report of the superintendent, dated December 31st, 1903, the directors gave instructions to clean up all ore and suspend operations indefinitely.

In the vicinity of Fairview, in the Osoyoos Mining Division, the very large quartz veins, carrying low values in gold, which for some years have not been worked, have again been opened up and some tons milled by the Stemwinder Company.

Near the town of Hedley, on the Similkameen river, very extensive and satisfactory development has been made by the Nickel Plate Company on its property, the ore in which is chiefly iron sulphides carrying gold. Extensive preparations have been made for the treatment of the ores by the erection of a milling plant at Hedley, to be followed by a smelter when required.

In the Lillooet District two companies have been treating free milling quartz, while other promising prospects in that vicinity are under development.

A 10-stamp mill is being erected on Siwash creek, in the Yale Division, to work a large deposit of gold-bearing material.

In the Slocan the "lead bounty" has stimulated the development of existing mines and the more thorough investigation of properties which may, under such bounty, become producers, but the full effect of this measure will not be seen before the coming season.

In the Trout Lake Division extensive plants for the transportation and treatment of the ores have been erected but are not yet under way. In the southern end of this Division, gold-bearing quartz ledges have attracted much attention, and it is expected that a stamp-mill will be shortly erected there.

In the Lardeau Division two stamp mills have been erected near Camborne, and operations were started up near the close of the year.

BUREAU OF MINES.

WORK OF THE YEAR.

The routine office work of the Bureau is confined practically to technical matters, replying to questions both verbal and written as to same, answering prospectors and others as to markets and market values of minerals, examining reports of Inspectors, the collection of statistics and information regarding the mineral deposits of the Province, and the supplying of information to inquirers. In connection with this work, about 1,680 letters, etc., were written and sent out, in reply to about a corresponding number of letters inward.

Provincial Mineralogist.

The Provincial Mineralogist left Victoria on June 23rd for East Kootenay, where he was occupied in the vicinity of the Crow's Nest Pass coal mines until July 11th. A trip was then made to Perry creek, the recent developments there were inspected and afterwards the mines in the vicinity of Kimberley were visited.

On returning to Cranbrook instructions were received to inspect the oil lands in the south-east corner of the Province. Arrangements were consequently made for a pack train, and while it was being prepared a trip was made to the Windermere District, and the producing mines of that section were examined.

Returning to Fort Steele, a start was made for the oil lands, travelling by pack-train and taking in *en route* Bull river and the recent mining developments there.

Proceeding via Elko to Tobacco Plains, the Elk river had to be crossed. As the bridge was out and the water still high, some delay was experienced, so that Tobacco Plains was only reached on the 12th August.

From Tobacco Plains the trail usually taken to the Flathead river runs through the State of Montana, but it was considered better to attempt to find a feasible trail through Canadian territory, which was done, the Flathead river being reached on the 20th. There being no maps of this section, some small amount of surveying had to be done, and the various "oil springs" were then examined. Some difficulty was experienced in finding these, as the information received concerning their location was very misleading. Delays from various causes having consumed more time than was expected, food supplies gave out and a quick trip had to be made into Alberta, the nearest supply point for these essentials. An examination was made of the occurrence of oil at the points where boring was being done on the east side of the Rocky mountains.

Returning to the main Flathead river, the latter was followed up to its headwaters. There being no trail, the bed of the stream had to be followed for a considerable portion of the distance, the river valley and the beds of the tributary creeks being examined on the way. The summit between the Flathead and the Lodgepole rivers was crossed in a blinding snowstorm on the evening of September 19th, and Morrissey and Elko were reached next day. On the 25th all matters connected with the pack-train were disposed of at Fort Steele, and at Cranbrook instructions were received to visit Poplar Creek, which point was reached on September 28th, and the principal claims in the vicinity examined. Proceeding thence to Trout Lake and Ferguson, which point was reached on October 1st, the producing mines of that section were also examined. From here a trip was made to Camborne, in the Lardeau Mining Division, to examine the properties about to begin producing in that vicinity.

Return was made to Victoria on the 10th October, where a week was lost through sickness contracted in the field, after which a report on the Flathead District was prepared and submitted to the Government.

On the 30th October, leave of absence of six weeks having been obtained, the first in five years, a trip to certain Eastern points was made, much of the time being spent in examining various Eastern smelters and investigating recent improvements in metallurgical operations, return being made to Victoria on December 10th, when the work of collecting and preparing the statistics for 1903 was begun, and occupied the remainder of the year.

In the collection of these statistics, it is found that willing and prompt compliance is given with the Act calling for yearly returns of output, and that every assistance is afforded by all but a few mines; these few, however, either through intent or negligence in making returns, unduly delay the publication of the final figures. It is felt that it is not fair to make the many wait for the few, and that in future, with whatever reluctance, decided steps will have to be taken to enforce the penalties of the Act against delinquent mines.

ASSAY OFFICE.

The following is a summary of the work of the Assay Office, as reported by the Provincial Assayer:—During the year some 720 assays or quantitative determinations were made; these included a number for the Department of Mines, for which no fees are shown. The receipts were as follows:—

Fee for ordinary assays	$186 00
Fees for gold bullion assays	340 00
Fees from Assayers' Examination	270 00
Value of work done for other Departments and not charged for	250 00
Total	$1,046 00

Free Determinations.

In addition to the above, a large number of qualitative determinations were made of minerals and rocks sent into the Department for identification and classification. For this latter work no fees were charged, in accordance with the established custom of the Department, such qualitative determinations being made free with the idea of assisting prospectors and others in the search for new minerals or new mineral districts.

Gold Melting and Assaying.

The value of gold melted, and for which Provincial Government Assay Certificates were issued during the year 1903 was $152,675, representing 164 lots. The Provincial Government at Victoria pays in cash the full mint value of all gold dust brought in within 24 hours of its receipt, enabling the miner to continue his journey, if he so desires, with very little delay, and, furthermore, men arriving from the Yukon without ready money are enabled, by producing their receipt showing that they have deposited a certain amount of gold dust with the Provincial Government for assay, to obtain an immediate advance from any of the local banks. All gold bars are assayed independently by two assayers who check one another, so that the depositor is assured that he will obtain the highest possible value for his gold dust.

Water Analyses.

A considerable number of samples of water were analysed during the year; some of these were found to be very bad indeed, particularly certain well waters which were found to be entirely unfit for drinking purposes.

Platinum.

Samples of black sand were analysed as usual for the platinum group of metals. This work led to the search for some better methods of separation than those used hitherto for this group, and a series of experiments were accordingly made with the object of separating gold, silver, platinum and osmiridium. As the results of these experiments are of interest to the Assayers of the Province they are here given.

Osmiridium.

The separation of the osmiridium group from the noble metals does not present any special difficulty if little silver be present. The ore or black sand is fluxed in a crucible in suitable manner and the lead button cupelled; the resulting bead is rolled out and boiled with dilute sulphuric acid (1 to 10), letting the acid gradually grow stronger; then, after washing, by boiling with nitric acid, again washing and dissolving in *aqua regia*, the osmiridium group alone remains, with perhaps a trace of silver chloride, which may be removed by solution in ammonia. The separation of gold, silver and platinum presents some difficulty, as the following experiments will show:—

Separation of Platinum from Gold

Alloys of the composition shown in Table I. were made by wrapping the metals in sheet lead and cupelling. As the experiments gave negative results as far as method of separation was concerned, a series of alloys were made as shown in Table II., gradually decreasing the proportion of platinum to gold. A number of experiments were made with the alloy, with the same result as that given. After finding that platinum would separate out with this low ratio of platinum to gold, a number of experiments were conducted to ascertain how a higher ratio would separate. The result of one of these experiments is given in Table III.

With 10 mgrms. to the same amount of gold some of the platinum was left in the cornet, so that 7 per cent. of platinum to gold seems to be the highest ratio that can be successfully parted.

400 mgrms. of added silver were found to part as successfully as 500 mgrms., and at the same time to give a more compact cornet, not so liable to break up.

The action of mass seems to play a part in this separation, as 7 mgrms. of platinum, added to 100 mgrms. of gold, parted successfully, but when double the quantity of both metals was taken, as in the alloy of 14 mgrms. of platinum to 200 mgrms. of gold, the cornet did not part; but by increasing the gold to 300 mgrms. it did part. A number of experiments were then made with a view of separating the silver from alloys of gold, platinum and silver. The results are given in Table V.

A series of alloys of silver and platinum without any gold were also parted, both in nitric and sulphuric acids, but no satisfactory results could be obtained. A separation of platinum from gold and silver alloy was also attempted by precipitation as potassium chloro-platinite. This, however, presents many difficulties; the alloy is for practical purposes insoluble in *aqua regia* owing to silver chloride being precipitated on the cornet and preventing further action. This difficulty may, to a certain extent, be overcome by first parting in sulphuric acid and then taking out the last of the silver with nitric acid, washing and dissolving in *aqua regia.* To precipitate platinum with potassium chloride requires that the solution be fairly concentrated; in doing this it is difficult to prevent the gold chloride from decomposing and precipitating metallic gold. Potassium chloride is to be preferred to ammonium chloride in precipitating platinum, owing to its being slightly less soluble in alcohol.

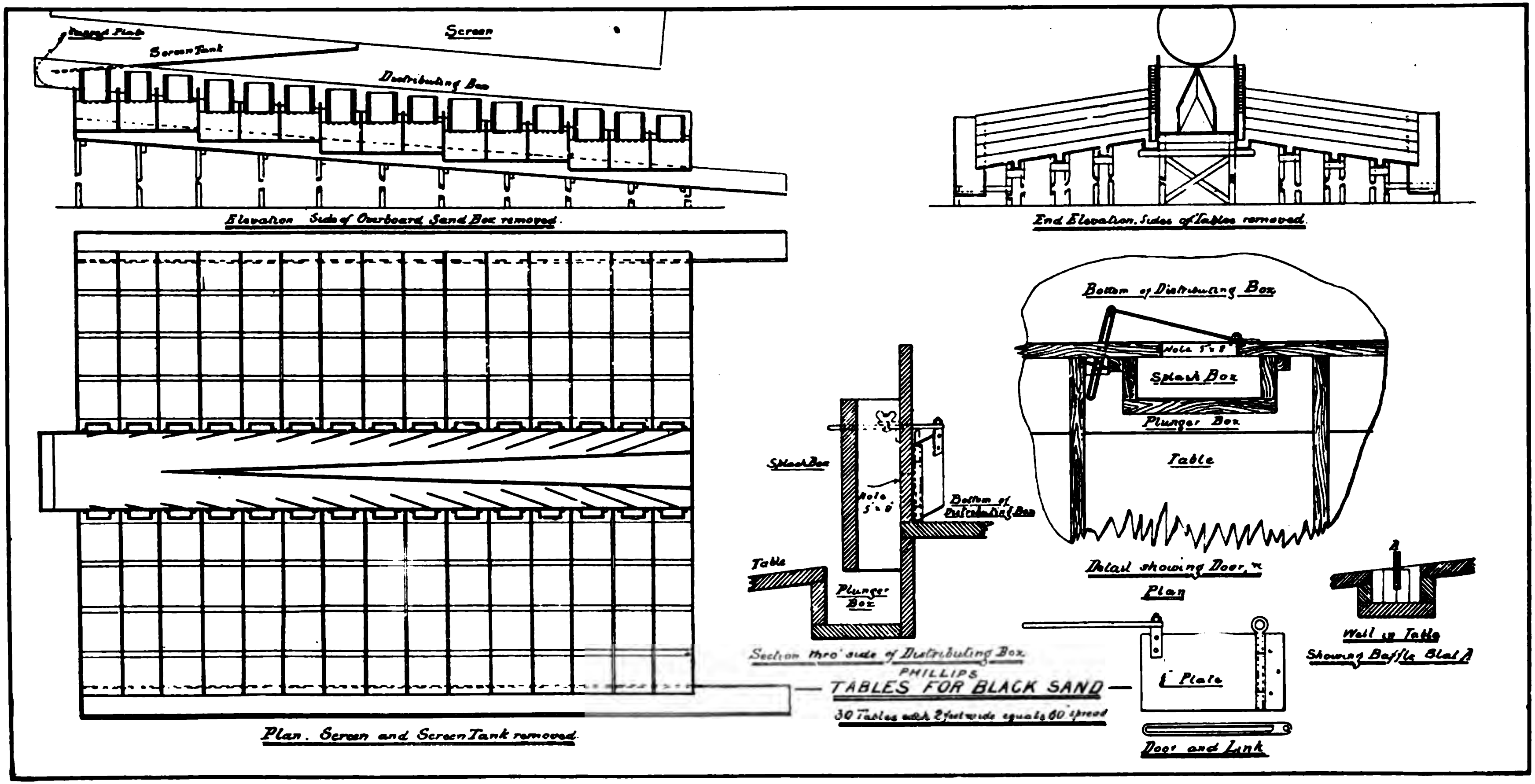

Ragged Plate
Screen
Screen Tank
Distributing Box
Elevation Side of Overboard Sand Box removed.
End Elevation. Sides of Tables removed.
Bottom of Distributing Box
Hole 5 x 8
Splash Box
Plunger Box
Table
Detail showing Door, &c.
Plan
Splash Box
Hole 5 x 8
Bottom of Distributing Box
Table
Plunger Box
Section thro' side of Distributing Box.
PHILLIPS
— TABLES FOR BLACK SAND —
30 Tables each 2 feet wide equals 60' spread
L Plate
Door and Link
Well in Table
Showing Baffle Slat A
A
Plan. Screen and Screen Tank removed.

TABLE FOR SAVING FINE GOLD FROM DREDGING.

(Reproduced from Report of Minister of Mines, 1902, New Zealand.)

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ASTOR, LENOX AND
TILDEN FOUNDATIONS

TABLE I.

Alloy.	Mgrms.	Result.
Gold	100	Cupelled, rolled, and boiled in strong HNO$_3$. Platinum did not part properly.
Platinum	100	
Silver	1,000	
Gold	100	Cupelled, and parted in strong HNO$_3$: resulting cornet weighed 113.5 mgrms., showing 13.5 mgrms. of platinum retained by cornet. Duplicate, same result.
Platinum	100	
Silver	1,200	
Gold	100	Cupelled, and parted in strong HNO$_3$: cornet weighed 113.5, showing 13.5 mgrms., of platinum retained by cornet. Duplicate, same result.
Platinum	100	
Silver	1,500	
Gold	100	Cupelled, and parted in strong HNO$_3$: cornet weighed 112.5 mgrms., showing 12.5 mgrms. of platinum retained by cornet. Duplicate, same result.
Platinum	100	
Silver	2,000	
Gold	100	Cupelled, and parted in strong HNO$_3$: cornet weighed 95 mgrms., showing that a loss had occurred.
Platinum	100	
Silver	5,000	

Note.—In the last experiment the platinum had not all parted out, giving a dull grey colour to the gold cornet; the cornet was also partly broken up and the particles floated as a fine powder on the parting acid. A loss was occasioned in this manner, and also perhaps by the amount of nitrous oxide evolved in the solution of the large amount of silver.

TABLE II.

Alloy.	Mgrms.	Result.
Gold	100	Cupelled and parted first in 21° B. and then in 32° B. HNO$_3$: resulting cornet weighed 102.7 mgrms., showing 2.7 mgrms. of platinum left in cornet. Duplicate, same result.
Platinum	20	
Silver	300	
Gold	100	Cupelled, and parted twice in 32° B. HNO$_3$: resulting cornet weighed 101.2 mgrms. Duplicate weighed 100.2 mgrms.
Platinum	15	
Silver	400	
Gold	100	Cupelled, and parted in first 21° B., second in 32° B. HNO$_3$: resulting cornet weighed 100.8 mgrms. Duplicate weighed 100.4 mgrms.
Platinum	10	
Silver	300	
Gold	100	Cupelled, and parted first in 21° B., second in 32° B., HNO$_3$: resulting cornet weighed 100.2 mgrms. Duplicate, same result.
Platinum	10	
Silver	500	
Gold	100	Cupelled, and parted in first 21° B., second in 32° B. HNO$_3$: resulting cornet weighed 100 mgrms., showing that the platinum had all been removed, except perhaps an unweighable trace.
Platinum	5	
Silver	500	

TABLE III.

Alloy.	Mgrms.	Result.
Gold	100	Cupelled, and parted in first 21° B., second in 32° B. HNO$_3$: resulting cornet weighed 100.2 mgrms.
Platinum	7	
Silver	400	

TABLE IV.

Alloy.	Mgrms.	Result.
Gold	200	Cupelled, and parted in 21° B. and 32° B. HNO_3: resulting cornet weighed 200.3 mgrms., showing 0.3 mgrm. of platinum retained; cornet broke up in parting. Duplicate was parted in 21° B., still more diluted and did not break, and weighed 200.3 mgrms.
Platinum	14	
Silver	800	
Gold	300	Cupelled, and parted in 21° B. and 32° B. HNO_3: resulting cornet weighed 300 mgrms. This would show that as a larger quantity of platinum has to be parted, gold must be added in increasing ratio.
Platinum	14	
Silver	900	
Gold	200	Cupelled, and parted in 21° B. and 32° B. HNO_3: resulting cornet weighed 200 mgrms.
Platinum	10	
Silver	600	

TABLE V.

Alloy.	Mgrms.	Result.
Gold	100	Cupelled, and parted in strong H_2SO_4: resulting cornet weighed 204.7 mgrms., showing 4.7 mgrms. of silver left behind. Duplicate, same result.
Platinum	100	
Silver	500	
Gold	100	Cupelled, and parted in strong H_2SO_4: then in strong HNO_3: resulting cornet weighed 204 mgrms. Duplicate weighed 200.6 mgrms.
Platinum	100	
Silver	500	
Gold	100	Cupelled, and parted in dilute H_2SO_4: resulting cornet weighed 105.5 mgrms. Duplicate weighed 105.4 mgrms.
Platinum	5	
Silver	300	
Gold	100	Cupelled, and parted in dilute H_2SO_4: resulting cornet weighed 105.3 mgrms. Duplicate weighed 105.2 mgrms.
Platinum	5	
Silver	300	
Gold	50	Cupelled, and parted in dilute H_2SO_4, washed and parted in strong HNO_3: resulting cornet weighed 55.3 mgrms. Duplicate weighed 55.2 mgrms.
Platinum	5	
Silver	300	
Gold	25	Cupelled, and parted in dilute H_2SO_4, washed and parted in strong HNO_3: resulting cornet weighed 30.3 mgrms. Duplicate cornet weighed same.
Platinum	5	
Silver	300	

NOTE.—This last experiment showed 0.3 mgrm. of silver retained or 0.1 per cent., which was the best result obtainable, while it is not entirely satisfactory; a close assay could probably be made by running through a proof alloy under similar conditions and deducting the surcharge of silver found from the regular assay.

Oil Analyses. Analyses of oil from springs in South-East Kootenay will be found in the Provincial Mineralogist's report on that District. Shale from Ward's Camp, Cariboo District, was examined and found to contain oil; special mention of it will be found in the report on Cariboo District.

Mineral Museum. New signs were erected to better direct people to the Museum, with the result that the number of visitors was at least double that of any previous year. The cases are being gradually filled with specimens and are kept up to date.

In addition to his usual duties, the Provincial Assayer visited all the principal properties situated on or near Quatsino sound, at the north end of Vancouver Island.

ASSAYERS' EXAMINATION.

REPORT OF THE SECRETARY OF THE BOARD OF EXAMINERS.

SIR,—I have the honour to submit my Annual Report as Secretary of the Board of Examiners for Certificates of Competency and Licence to Practise Assaying in British Columbia, as established under the "Bureau of Mines Act Amendment Act, 1899."

The Act referred to requires that at least two examinations shall be held in each year, and these duly took place, one at Nelson on the 27th of April and following days in the laboratory of the Hall Mines Smelter, and the other in the Government Laboratory at Victoria on the 7th of December and following days. At the Nelson examination two candidates entered and two passed; at the Victoria examination seven candidates entered and six passed.

The Board recommended the granting of three certificates under sub-section (2) during the year.

LIST OF ASSAYERS HOLDING PROVINCIAL CERTIFICATES OF EFFICIENCY UNDER THE "BUREAU OF MINES ACT AMENDMENT ACT, 1899," ON JANUARY 1ST, 1904.

Only the holders of such certificates may practise assaying in British Columbia.

Under section 2, sub-section (1)—

Austin, John W	Vancouver.
Ayres, D. A	Mexico.
Baker, C. S	Victoria.
Barke, A	Crofton.
Bishop, Walter	Vancouver.
Campbell, Colin	Nelson.
Carmichael, Norman	Nelson.
Church, George B	Nelson.
Clarke, Roy H	Rossland.
Cobeldick, Wm. M	
Comrie, Geo. H	Vancouver.
Collinson, H	Ladysmith.
Crerar, Geo	
Cruickshank, G	Rossland.
Davis, A. B. C	Greenwood.
Day, Athelstan	Vancouver.
Dedolph, Ed	Kaslo.
Dockrill, Walter R	Crofton.
Farquhar, J. B	Vancouver.
Gooding, L. E	
Haseltine, R. S	Rossland.
Hawkins, Francis	Nelson.
Hurter, Ch. S	Ladysmith.
John, D	Ferguson.
Kitto, G. B	Victoria.
Lang, J. G	Greenwood.
Ley, Rich. N	Nelson.
Marsh, Richard	Rossland.
Marshall, Wm. Stone	Ladysmith.
Nicholson, Ch. F	
O'Sullivan, John	Vancouver.
Perkins, Walter G	Grand Forks.
Pickard, T. D	Fairview.
Robertson, Thomas R	
Rombauer, A. B	Crofton.
Segsworth, Walter	Greenwood.
Sim, Charles John	Victoria.
Snyder, Blanchard M	Spokane, Wash.
*Snyder, Wm. D	
Sundberg, Gustave	Greenwood.
Tally, Robert E	Trail.
Thomas, Percival W	Van Anda.
Tretheway, John H	Vancouver.
Turner, H. A	Kamloops.
Vance, John F. C. B	Vancouver.
Vans Agnew, Frank	London, Eng.
Wales, Roland T	Trail.
Watson, Wm. J	Ladysmith.
Welch, J. Cuthbert	Northport.
Whittaker, Delbert E	Victoria.
Widdowson, E. Walter	Trail.
Williams, W. A	Grand Forks.
Wilson, C. M	Sandon.

* Dead.

LIST OF ASSAYERS HOLDING CERTIFICATES OF EFFICIENCY.—*Concluded.*

Under section 2, sub-section (2)—

Archer, Allan	Ymir.
Bryant, Cecil M	Vancouver.
Blaylock, Selwyn G	Fernie.
Clothier, Geo. A	
Cole, Arthur A	Rossland.
Coulthard, R. W	Fernie.
Cowans, Fred	Silverton.
Dixon, Howard A	Toronto, Ont.
Galbraith, M. T	Greenwood.
Gilman, Ellis Philip	Vancouver.
Green, J. T. Raoul	Nelson.
Guess, Geo. A	Greenwood.
Gwillim, J. C	Kingston, Ont.
Heal, John H	Nelson.
Hilliary, G. M	Phœnix.
Holdich, Augustus H	Camborne.
Johnson, William Steele	Slocan.
Kaye, Alex	Atlin.
Lay, Douglas	
Lewis, Francis B	Grand Forks.
Merrit, Charles P	Grand Forks.
McArthur, Reginald E	Rossland.
McFarlane, James	Vancouver.
McLellan, John	Rossland.
Maclennan, F. W	Rossland.
McVicar, John	Ymir.
McNab, J. A	Trail.
Musgrave, Wm. N	Crofton.
Mussen, Horace W	
Noble, David T	Trail.
Outhett, Christopher	Kamloops.
Shannon, S	Ferguson.
Stevens, F. G	Rossland.
Thomson, H. Nellis	Trail.
Turnbull, J. M	Rossland.
Watson, A. A	Vernon.
Watson, Henry	
*West, Howard	New Denver.
Wright, Rich. L	Rossland.
Wynne, Llewellyn C	Rossland.

Under section 2, sub-section (3)—

Carmichael, Herbert (Provincial Assayer.)	Victoria.
Harris, Henry	Nelson.
Kiddie, T. (Supt. Smelter)	Ladysmith.
Marshall, Dr. T. R	London, Eng.
McKillop, Alexander	Nelson.
Pellew-Harvey, Wm	London, Eng.
Robertson, Wm. F (Provincial Mineralogist.)	Victoria.
Sutton, Wm. J	Victoria.

PREVIOUSLY ISSUED UNDER THE "BUREAU OF MINES ACT, 1897," SECTION 12.

Pinder, W. J. B	Dawson, Y. T.
Thompson, James B	Vancouver.

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* Dead.

EXAMINATION FOR COAL MINE MANAGERS.

Under the provisions of the "Coal Mines Regulation Act," the manager having control and daily supervision over any coal mine in the Province of British Columbia, must hold a certificate of competency issued under such Act.

At the meeting of the Board of Examiners duly held on October 31st, 1902, it was unanimously decided to hold examinations simultaneously at Nanaimo and Fernie, on January 19th, 20th and 21st, 1904. As the results of these examinations are to hand before the publication of this year's Report they are published herein, although, strictly speaking, they appertain to the year 1904.

The papers were, as usual, prepared in advance, and identical examinations were held at the two centres mentioned. The general scope and character of the examination have been fully set out in previous Reports. Eleven candidates presented themselves for examination, and the following seven were successful:—

Donald McLean, Ladysmith.
Geo. Wilkinson, Nanaimo.
H. B. Wright, Fernie.
R. W. Coulthard, Fernie.
J. Richardson Roaf, Fernie.
John John, Fernie.
H. L. Manley, Fernie.

Registered List of Colliery Managers' Service Certificates Issued Under Section 39, "Coal Mines Regulation Act, 1897."

John Bryden, Victoria.
*James Gillispie.
Edward G. Prior.
Thomas A. Buckley.
*John Dick.
Archibald Dick, Government Inspector of Mines.
James Dunsmuir, Victoria.
James Cairns, Comox, farmer.

"Coal Mines Regulation Act, 1877," Registered List of Certificates of Competency

Name.	Address.	Date.	
Shepherd, Francis H.	Nanaimo	5th March,	1881.
Gibson, Richard	〃	〃	〃
*McGregor, William		〃	〃
Honobin, William	not known	1st May,	1882.
*Muir, Archibald		〃	〃
Little, Francis D	Ladysmith	〃	〃
Martell, Joshua	Nanaimo	〃	〃
*Scott, Robert		〃	〃
Chandler, William	not known	21st December,	1883.
Priest, Elijah	Extension	〃	〃
McGregor, James	Inspector of Mines, Nelson	18th January,	1888.
Randle, Joseph		〃	〃
*Dickinson, Urick Evan		8th January,	1889.
Matthews, John	Union	〃	〃
*Jones, John Bunyan Louis		〃	〃
Norton, Richard Henry		26th August,	〃
Bryden, Andrew	Extension	30th December,	〃
Russell, Thomas	Nanaimo	20th April,	1891.
Sharp, Alexander	not known	27th October,	〃
*Lindsay, William Alfred		4th March,	1892.
Kesley, John	Union	〃	〃
Wall, William H	Nanaimo	30th May,	1896.
Morgan, Thomas	Inspector of Mines, Nanaimo	〃	〃
Wilson, David	Extension	〃	〃
Smith, Frank B	Inspector of Mines, N. W. T., Calgary	〃	〃
*Jamieson, Robert		〃	〃
Bradshaw, George B	Nanaimo	12th June,	1899.
Simpson, William G	Extension	〃	〃
*Fisher, Robert		5th November,	〃
Hargreaves, James		5th February,	1901.
Drinnan, Robert G	Crow's Nest, Fernie	〃	〃
Browitt, Benjamin	Nanaimo	3rd August,	〃
Stockett, Thomas, Jr	Fernie	〃	〃
Pearson, Robert	〃	〃	〃
Cunliffe, John	Extension	〃	〃
*Lamb, Robert B	Fernie	〃	〃
Evans, Daniel		〃	〃
McEvoy, James	Fernie	17th October,	1902.
Wilson, A. R.	Michel	〃	〃
Simister, Charles	Fernie	〃	〃
Colville, Andrew	〃	〃	〃
Budge, Thomas	Nanaimo	〃	〃
Mills, Thomas	〃	〃	〃
Faulds, Alexander	〃	〃	〃
Richards, James A		〃	〃
McLean, Donald	Ladysmith	21st January,	1904.
Wilkinson, Geo	Nanaimo	〃	〃
Wright, H. B	Fernie	〃	〃
Coulthard, R. W	〃	〃	〃
Roaf, J. Richardson	〃	〃	〃
John, John	〃	〃	〃
Manley, H. L.	〃	〃	〃

*Dead.

Examinations of coal miners, &c., have been duly held in accordance with the "Coal Mines Regulation Act Amendment Act, 1901."

CASSIAR DISTRICT.

REPORT OF J. A. FRASER, GOLD COMMISSIONER.

I have the honour to enclose herewith my annual report on mining operations carried on in the Atlin, Bennett and Chilkat Mining Divisions of Cassiar District during the year ending 31st December, 1903.

ATLIN MINING DIVISION.

The local conditions are continually changing here, but I might still reiterate some of the observations of my last report as being applicable at the present time, particularly those as to the necessity, or at least desirability, for some form of survey of holdings on the Creeks and as to the difficulties arising from water (or scarcity of water) and the disposition of "tailings" and débris.

The cancellation of a large number of unworked leases has encouraged re-location and the ground has in many cases passed into the possession of companies from which more active development may be expected. The drifting operations of the last two winters have encouraged still further efforts of that nature, and with satisfactory returns to the operators.

From 800 to 900 men were actually employed in mining last season, and whilst a great amount of "dead work" was being done, it will be noted that a considerable increase in revenue has been obtained.

The abolition of the offices of Mining Recorder at Bennett and Wells will materially lessen the gross expense of administering the District, without imposing any material increase of labour upon the officials still remaining.

Pine Creek.

Individual operations on this creek were lighter this season than heretofore, which was to be expected, for the reasons given in previous reports, but the results obtained by those who did operate were fairly satisfactory. The probabilities are, however, that much less will be done in the way of individual operation upon this creek for the future, as the British-American Dredging Company, Limited, has acquired by purchase (at a very fair figure) a large portion of what was being most successfully operated by individual methods, and what with its holdings and those of the various hydraulic companies, little room is left for individual operation.

Last winter a large number of men were drifting on both Pine creek and Gold Run, but owing to the acquisition just mentioned of so much of the ground by the various companies, very little is being done in this direction this winter. About 25 men are drifting on Gold Run and about 20 on Pine creek.

THE BRITISH-AMERICAN DREDGING CO., LIMITED.

O. T. Switzer, General Manager.

This company has acquired a large number of hydraulic leases, comprising a considerable extent of alluvial ground, and is still acquiring more, so that already it controls a very large aggregate area, some portions of which are known to be rich. Among other properties acquired are the leases on Gold Run and Pine creeks known as the *Ophir*, *Earth* and *Cosmopolitan Groups.*

The company brought in a Keystone drill, with which it operated for upwards of three months, prospecting its various properties, at an aggregate expenditure of about $20,000, with unqualified success and satisfaction. A Bucyrus dredge and an electrical power plant capable of producing 500 h. p. were also brought in. The dredge was placed upon one of the *Ophir Group* of leases on Gold Run creek and the power plant a short distance below the "Falls" on Pine creek. In conjunction with the construction and installation of the dredge and power plant, this company excavated over one and a half miles of ditch, laid 1,800 feet of 30-inch steel pipe, built 400 feet of wooden flume, erected 6 miles of pole line equipped with 5 wires, using over 25 miles of copper wire, built a transformer house near the dredge site, together with dams, pressure box and the camp buildings, etc., necessary for the work and to accommodate its employees, at an aggregate expenditure of about $300,000.

Notwithstanding that the utmost diligence was manifested and a large force of men employed, the delays consequent upon the transportation of the heavy plant and timber, upwards of 700 tons of which had to be imported, in addition to such local timber and lumber as could be utilised, besides other causes, retarded the completion of the dredge and power plant until about the close of the season, and the management had to reluctantly content themselves with having everything ready for commencing operations with the opening of the season of 1904. The progress of this work was watched with unusual interest and its non-completion in time for operation this season was disappointing to more than the management, for if its operation proves as successful as similar plants have done elsewhere, it will mark an epoch in the history of mining in this District and in British Columbia, and with the values known to exist in some of the ground, will surely prove remunerative to the owners.

The company contemplates the construction of several dredges upon its various properties in this District. As many as 100 men were employed by the company, the average during the season being 60.

THE PINE CREEK POWER COMPANY, LIMITED.

The Pine Creek Power Company, Limited—F. T. Blunck, President; M. W. Loveridge, hydraulic superintendent and foreman, L. H. Griffith, general manager—as anticipated in last year's report, opened up new pits, installed hydraulic derricks, and with other improved methods made a much better showing than during any previous season. The high benches on the south side of Pine creek were attacked with excellent results, and the existence of an old river channel away to the south of the present channel has apparently been proved. Piping was in progress from June 23rd to October 17th, over 108,000 cubic yards of gravel being moved, at a cost of nearly $21,000, and a very handsome profit realised over and above all expenses. The best evidence of the confidence of the management in the property is that they have spent over $27,000 in further equipment and disposition of plant, etc., employing an average of 30 men during the season.

THE ATLIN AND WILLOW CREEK GOLD MINING COMPANY, LIMITED.

This company, not having succeeded in securing the settlement of its litigious and other difficulties, did not do much work during the season but still had quite a number of men employed on "lays" and otherwise. The Manager, Mr. Frank H. Brackett, went out without responding to my request for a statement, and I cannot, therefore, give any more extended notice of its operations.

THE EASTERN HYDRAULIC MINING COMPANY.

John F. Deeks, Manager.

This company, operating on the south side of Pine creek above Discovery, built a considerable length of ditch and had, I understand, a successful season, but as the Manager also failed to respond to my request for particulars, I cannot give details of operations.

THE NORTH COLUMBIA GOLD MINING CO., LTD.

J. M. Ruffner, Manager.

This is a new company which has been operating this season in both placer and quartz mining, with, I believe, encouraging results. In placer mining it worked a number of claims on Gold Run with very fair returns; but assuming that the methods in vogue were rather crude and expensive, the management has decided to instal a plant with a view to more economical operation, being well satisfied, apparently, with the values obtainable. The company has also bonded the property of the Stephendyke Hydraulic Mining Partnership, Limited, and in order to prospect the same satisfactorily has constructed about 1½ miles of flume, etc. About $9,000 was expended in prospect and development work in connection with this property and demonstrated to the satisfaction of the management the presence thereupon of the same rich pay streak or gravel found on Gold Run and down along Pine creek through the Pine Creek Power Company's property. Good results are anticipated from next year's operations.

Spruce Creek.

On this creek a large number of individual miners worked during the season, with excellent results, and had it not been for the scarcity of water, which increased the cost of operation and eventually compelled many to cease sluicing earlier than heretofore, together with the damage done by the spring floods, the showing per capita would have been very good indeed. This was the best creek this season from the individual miner's standpoint. Last year I reported from one to two ozs. per diem per man, but this year many realised better pay even than that. Nearly $100,000 was reported for royalty by the individual miners on the creek this year, being nearly $35,000 better than last year. The lower portion of the creek, for perhaps two or three miles, is pretty well worked out, as far as the creek bed and open work is concerned, but much of the upper portion is practically virgin ground and is being opened up as the lower parts are being worked out. The benches have been but little worked, but sufficiently so to show that there is very good pay to be had by drifting, and from 100 to 150 men are so employed this winter. I might say that the spring freshet in May and the early part of June did much damage in tearing out wing-dams and sluice-boxes and filling up pits, and materially affected the output as above mentioned.

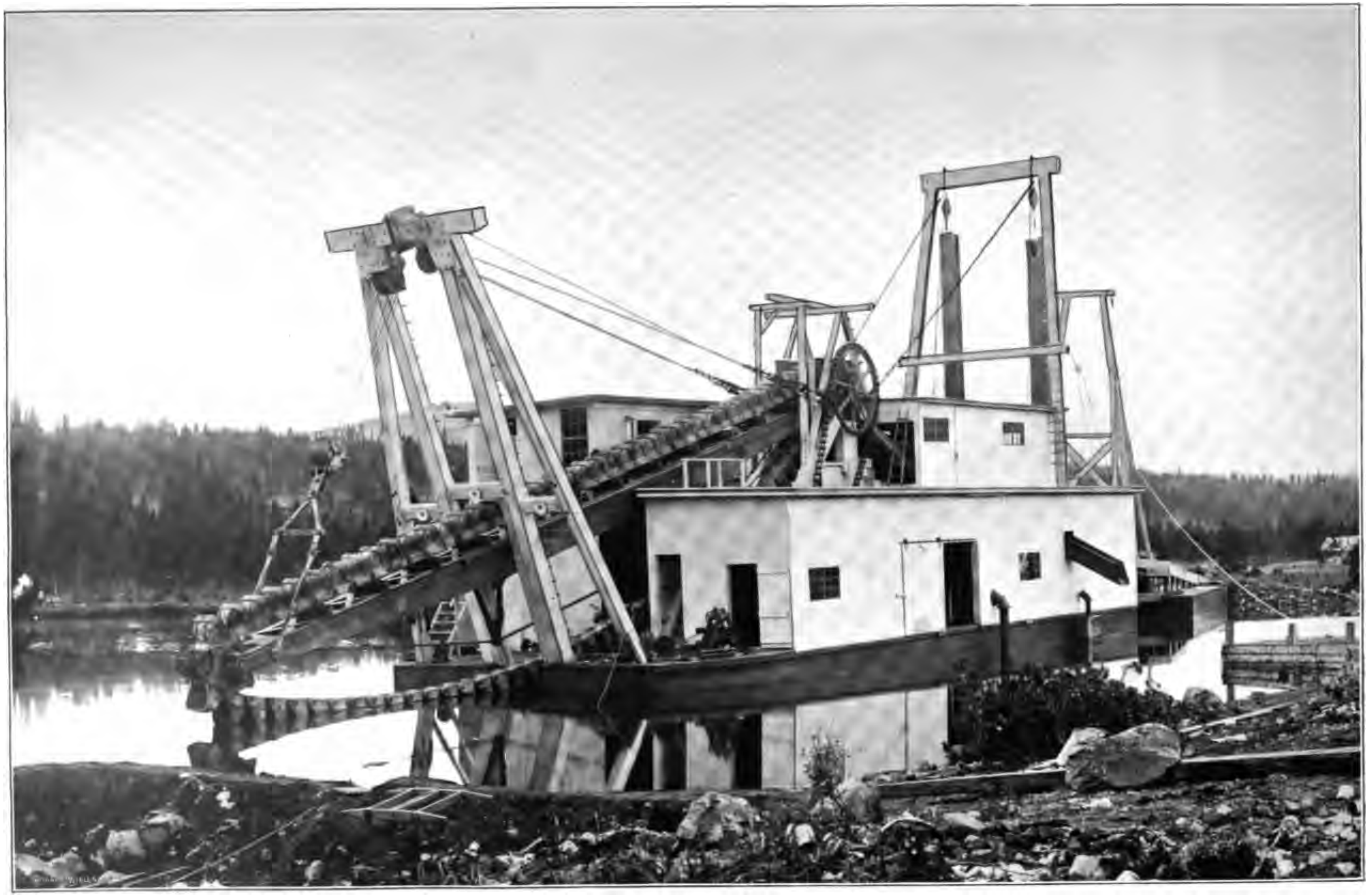
THE CONSOLIDATED SPRUCE CREEK PLACERS, LIMITED.

C. B. Gaddis, Manager; H. Haslitt, Hydraulic Superintendent.

Of the hydraulic companies operating on Spruce Creek the Consolidated Spruce Creek Placers, Limited, is located nearest the mouth, and a good deal of preliminary work has been done this year in building ditches, flumes, &c., and installing plant preparatory to an early start next season. An average of 27 men was employed from June 19th to October 10th, with a maximum number of 43, and about $40,000 was expended.

The Gladstone Hydraulic Mining Partnership, S. O. Wheelock, manager, being hampered for want of water and room to dispose of tailings, has been prospecting and putting in a ditch line, on which work it had from 2 to 11 men employed, and expended nearly $3,000,000.

The Columbia Hydraulic Mining Company, under the management of Mr. E. F. Meisner, had to repair much damage done to its flume and plant by the high water, and between this and rebuilding retaining dams for the débris, &c., did very little piping. It built or rebuilt nearly 1,000 feet of flume and two retaining dams. An average of 15 men was employed for about three and one-half months, and about $7,500 expended.



B. A. DREDGING COMPANY'S DREDGE—GOLD RUN, ATLIN MINING DIVISION.

The property owned by the Camp Hammell Mining Partnership, although in lease form, was operated by individual methods, with about such results as are usually so obtained. Four men were employed during the season, and $2,500 is said to have been expended.

The Blue Canyon Partnership, R. A. Jackson, manager, John Letherdale, foreman, put on a friction hoist and derrick, and with an average of five men expended about $4,000, with fair results.

Next season I expect to find other companies operating on Spruce creek on an extensive scale, and much more work done than during any previous year. It should be added that several outfits of individual miners have derricks and hoists, most of them run by water and a few by steam, and these men have expended in certain instances far more than some of the companies; as, however, I have no details of the work done I cannot report upon it.

The Atlin Lake Company, Limited.

Birch Creek. The local management of this company again changed hands during the winter, and this season's operations were carried on under the management of A. Bryan Williams, with R. A. Lambert as foreman. The water supply on this creek being limited at best, the company was peculiarly and unfortunately embarrassed by the exceptional scarcity of water this season, and consequently did not accomplish as much as it otherwise might have done. However, the results of the season's operations were fairly satisfactory.

Birch creek, although completely abandoned by the individual miners for the last two years, has this season again attracted their attention, quite a number of claims have been located upon the upper portion of the stream, and if sufficient water can be obtained no doubt there will be much more activity exhibited next season than at any time since 1899.

Boulder Creek. On this creek the individual miners again made a very good showing, although there were not quite so many as in 1902, besides which, the scarcity of water in the autumn caused most of them to close down earlier than in the year preceding; for these reasons, principally, the aggregate output was not quite as large as in 1902. Quite a large number of men were drifting on this creek last winter, and this winter (1903-04) from 75 to 100 men are drifting there, with very encouraging results. The ground on the lower part of Boulder creek is very deep, one crew of individual operators having sunk nearly 60 feet to reach bedrock, but once down they are finding exceptionally rich gravel, and the indications are that they will be exceedingly well repaid for their outlay of time and money. Steam hoists, &c., are used in this ground, the depth of which is beyond the capacity of ordinary appliances.

Sociétè Minière.

Of the companies operating on this creek "La Sociétè Minière de la Colombie Britannique," of Paris, France, local manager, Mr. Henry Maluin, takes first place. Although this company owns a number of hydraulic leases, it is still confining its operations to the working out of individual claims which were acquired by purchase. Its ground is very rich, but owing to damage to its flumes, etc., from freshets and the débris from the operators above, it has, unfortunately, been subjected each year to a heavy loss of both money and time, which has prevented it thus far from realising the profits which, barring these reasons, would have undoubtedly been secured. This season with an average of 23 men and a maximum of 28, piping was in progress for 60 days, something over 20,000 cubic yards of gravel being moved and about $19,000 in gold cleaned up. Last spring the manager rebuilt the bedrock flume, at an expense of $5,000, making it 48″ wide and 40″ deep, and had it "riffled" with steel rails (railroad), but the water fell away so that he had to put in a partition, reducing the width to

30 inches. As the individual claims above become worked out the creek bottom grows wider and the facilities for retaining or avoiding the débris will be improved, and I then confidently expect to see this company realise good returns for all its dead work and lost time. I may say here that as yet no effort has been made by any of the operators to conserve or store water on this creek and this must be done by somebody before the best results and returns are secured.

On the *Non-Union* Lease, above Discovery, a small hydraulic plant was being installed, but the scarcity of water and other matters prevented the doing of much actual mining. It is intended, however, to make an early start next season.

The Boulder Creek Hydraulic Mining Company also expects to instal a plant on its ground and secure such returns as, from the development and prospecting already done, the management feel confident will be obtained.

Ruby Creek.

As anticipated in last year's Report, there were active operations on Ruby creek this year by a number of miners. Early in the year the leases that were held on the creek were cancelled, and the ground being thrown open for re-location quite a number of claims were immediately staked. One lot of about ten claims was grouped and called the "Ruby Creek Mining Partnership." This company spent about $3,000 putting in a bedrock flume and prospecting for bedrock. A depth of 30 feet was reached without finding bedrock but a considerable depth of pay gravel was passed through and the owners are well satisfied with their prospects, although they realised practically no returns for their labour. Other syndicates spent some time and money in like manner, but it remains for the coming season to demonstrate just what values, if any, are on the creek.

Wright Creek.

A small number of individual miners continue to operate on the upper portion of this creek, with fair success. The English Counties Hydraulic Syndicate, C. Dubois Mason, Manager, operated its leases during the season and installed a small hydraulic plant thereon, expending altogether about $7,000 with only indifferent success. The management is, however, still sanguine of good returns next season, when a better supply of water may be available.

On Otter creek, the Otter Creek Hydraulic Company, Limited, under the management of Mr. J. H. Brownlee, P. L. S., installed a hydraulic plant and did considerable deadwork, but owing to the supply of water failing early in the season no large returns were secured. I regret to say that the manager neglected to supply me with data from which to give a more extended notice of the property and operations.

NOTE BY PROVINCIAL MINERALOGIST.—Since the receipt of the report of the Gold Commissioner, Mr. Brownlee has been seen and has kindly loaned his official report as Managing Director, from which the following extracts have been made:—

OTTER CREEK HYDRAULIC MINING COMPANY.

From Report of J. H. Brownlee, Managing Director.

"This company has acquired Messrs. Carmichael & Moran's lease on Otter creek, consisting of three miles of the upper portion of the creek and the contiguous benches. The property has been successfully prospected by the former owners with excellent results, No. 1 and 2 pits being opened up. The plant installed by the present company during 1903 may be summarised briefly as follows:—

"Five thousand five hundred feet of supply flume, carrying a maximum flow of 1,000 inches of water, the supply pipe consisting of 2,000 feet of 12, 14 and 16-inch double rivetted No. 14 gauge; intake pipe, 28 inches, connecting with pressure box with sand tank, etc., all on solid gravel foundation, 246 feet above present workings; three No. 4 monitors with Hoskins deflectors; bywash consisting of 1,500 feet of ditch and 400 feet of double 12-inch pipe-line. The bedrock flume, 30 inches wide and 40 feet long, has been extended 150 feet. There is a full equipment of tools, blacksmith's supplies, etc., and a commodious dining-room, bunk-house, cook-house, foreman's cabin, blacksmith shop, tool-house, powder-house, stable and other buildings have been erected.

"Development began on July 1st, 1903, an opening being made 1,000 feet below No. 1 Pit; the rim was blasted out and the old channel, prospected by the former owners, was reached just as water gave out. A tunnel was also driven across the channel, which is 80 feet wide with a 4-foot pay-streak and a splendid bedrock grade up stream, with satisfactory results, and everything is in readiness for beginning work in 1904. Surveys have also been made for conserving dams.

"The company has also acquired 160 acres of bench ground below the present workings, which it is intended to prospect with Keystone drill. The principal owners (Mr. Switzer and associates) also have a lease of three miles of Flat creek ground which it is proposed to dredge.

"The company is in good financial condition and the outlook is most encouraging."

McKee Creek.

From 15 to 20 individual miners operated on McKee creek this year, with about the usual results, which have always been exceedingly good.

ATLIN MINING COMPANY.

R. D. Fetherstonhaugh, Manager; M. Brophy, Hydraulic Superintendent.

This company commenced mining on May 22nd, and operated 131 days, but owing to damage caused by spring freshets and scarcity of water in the autumn, only 54½ days' actual piping was done. In this time 9,500 square yards of gravel were uncovered, from which about $30,000 was recovered, while the manager estimates that about $8,000 is locked up in 700 feet of the sluice-boxes which, through an early attack of frost, they were unable to clean up, and another $8,000 was stolen when the sluice-boxes were robbed on the night of August 23rd last. This company was peculiarly unfortunate this season, (1) through damage done by spring floods, (2) by the robbery of its sluice-boxes, and (3) by being unable to clean up all its boxes and being thus denied the use of the gold locked up therein. About 40 men were employed, viz.:—25 labourers and 15 laymen working on percentage, the expenditure being about $22,000 for labour and $18,000 in building dam, flume and plant of various kinds.

On the McKee Consolidation, C. Christopher, Manager, not much work was done beyond getting the lumber on the ground for the flume and the partial construction of the same. Some drifting is being done on the ground this winter. I believe the owners intend to bring in a hydraulic plant over the ice and instal it early in the spring.

The McKee Consolidated Hydraulic, Limited, F. T. Hamshaw, Manager, has done considerable work in the way of laying flume, building retaining dams and dwellings and getting everything possible in readiness for active piping next spring. A good deal of prospecting has been done, with very satisfactory results to the management. I fully expect to see a large amount of work done on this property next season.

On Snake creek a number of leases have been taken up, but not much work has been done, although here also I expect there will be a hydraulic plant in operation before the close of the next season.

On Dixie creek and O'Donnell river, to which Dixie is tributary, a number of leases have been located, but no systematic prospecting has been done except in two places. In one place on

O'Donnell river a crew of four men worked for several months prospecting, with encouraging results, but they had to suspend operations for lack of funds to continue during the winter.

In another place on Bull creek, a tributary of Dixie creek, some leases were located last spring and the Bull Creek Hydraulic Syndicate expended about $1,600 in development, with results which promise active operations on a large scale next season. This property lies a considerable distance from Atlin, and roads and trails must be built for several miles to permit plant, etc., being brought in, but once in operation a large area of auriferous ground will be laid under contribution.

Graham Creek.

This creek having been abandoned by the individual miners, a small syndicate located a number of leases thereon, expended quite a sum of money in roads, surveys, prospecting, &c., and claims to have secured very encouraging prospects. The company expects to instal a plant next season.

A large number of mining and hydraulic leases have been located this season, and many that were ostensibly in good standing, but were delinquent in the matter of both rental and assessment, have been cancelled and the ground thrown open.

The actual operating portion of this season has, unfortunately, been very short, for two reasons. In the first place, the high water in May and early in June did much damage on all the creeks, by carrying away the water-wheels, sluice-boxes, wing-dams, etc., and in many instances it took three and four weeks of valuable time to restore the ground and appliances to the condition in which they were before the freshet; and, secondly, the snowfall being light last winter with not much rain during the summer, the water supply in all the creeks except Pine became so scarce that it was impossible to operate either wheels or sluices fully, and many had to suspend operations two or three weeks earlier than in the previous year, notwithstanding which, the acknowledged output is considerably in excess of that of 1902.

As already mentioned, men are drifting this winter on Boulder, Pine, Gold Run, Spruce and McKee creeks, and almost all of them are apparently satisfied with their prospects.

The supply of labour has not been equal to the demand during the season.

Mineral Claims.

Not much beyond the necessary assessment to keep them in good standing has been done on any mineral claims in this District this year, with the exception of the *Yellow Jacket* and adjacent properties operated by the North Columbia Gold Mining Company, Limited, the *Beavis Group*, the *Imperial Group*, the *Gleaner Group*, the *Engineer Group*, and the *White Moose*, on Taku arm.

On the *Yellow Jacket* and extensions Mr. Ruffner, for the North Columbia Gold Mining Company, Limited, has done considerable prospecting and sinking, having sunk one shaft 85 feet and intersected the ore body at that depth, finding very high values. There is a five-stamp mill on the property, and from 5 to 15 men were continuously employed.

On the *Beavis Group* little has been done this year, but sample shipments sent out to the smelter have given returns that have made the bondholders feel very well pleased with their property, and I understand they contemplate putting on a force of men at an early date with a view to permanent development and operation.

Little has been done on either the *Imperial Group* (Munro mountain), or on the *Gleaner* and *Engineer Groups* (Taku arm), since last report.

Considerable work has been and is now being done on *White Moose Group*, and the owners are very well satisfied with the extent and values of the ore body as already shown up. Until there is a reduction in the cost of supplies, and consequently in the price of labour and material, the development of quartz properties in this Division will be slow, especially while the returns from placer mining are so encouraging. Many locations on which only assessment work has been done are showing up very well as far as developed.

OFFICE STATISTICS—ATLIN MINING DIVISION.

Records issued, 225, representing	256	claims.
Re-records issued, 506, representing	540	〃
Bills of sale recorded	375	
Grouping permits issued	17	
Permits to move stakes issued	15	
Abandonments filed	31	
Leave of absence granted, representing	509	claims.
Free miners' certificates issued (individual)	819	
〃 〃 (companies)	11	
〃 〃 (special)	4	
〃 〃 (substitute)	1	
Mineral records issued	57	
Certificates of work issued	112	
Notices filed under "Mineral Act"	5	
Bills of sale recorded under "Mineral Act"	28	
Bills of sale recorded, "hydraulic"	108	
Applications for hydraulic leases cancelled	164	
〃 〃 declined	15	
Hydraulic leases cancelled	49	
〃 〃 applied for	191	
〃 〃 issued	37	
Water records applied for	27	
〃 issued	15	
〃 abandoned	2	
〃 cancelled	16	
〃 in force	59	
Investigations held by the Gold Commissioner under Part IX. of "Placer Mining Act"	44	

REVENUE COLLECTED.

Free miners' certificates, individual		$ 3,700 25
〃 〃 company		1,100 00
Mining receipts, lease rentals		9,345 00
〃 lease deposits		3,820 00
〃 water rentals		3,450 00
〃 bedrock flumes		225 00
〃 leave of absence		1,290 00
〃 other sources		5,053 65
		$27,983 90
Royalty on mines and minerals	$5,381 00	
Less amounts refunded	1,173 85	
		$4,207 15
		$32,191 05
Collection of revenue from all sources other than mining		$8,715 81
Total revenue of Atlin office for 1903		$40,906 86

GOLD PRODUCED UPON WHICH ROYALTY WAS PAID.

CREEK.	INDIVIDUAL MINERS.			COMPANIES.		
	Ounces.	Value.	Royalty.	Ounces.	Value.	Royalty.
Pine Creek	4,458	$ 69,090 00	$ 1,328 45	2,488	$ 38,565 00	$ 585 20
Spruce Creek	6,219	99,500 00	1,681 80	12	195 00	3 90
Boulder Creek	3,528	54,676 50	948 20	2,015	31,240 00	624 80
McKee Creek	432	6,696 00	60 70	258	4,060 00	80 00
Birch Creek	95	1,475 00	....	333	5,160 00	63 20
Wright Creek	100	1,550 00	6 00	....	....	....
Otter Creek	....	....	....	28	437 50	8 75
Total	14,832	$232,995 50	$4,015 15	5,134	$79,597 50	$1,365 85

SUMMARY.

	Ounces.	Amount.	Royalty paid.
Individual miners	14,832	$232,995 50	$4,015 15
Companies	5,134	79,597 50	1,365 85
Total	19,966	$312,593 00	$5,381 00

BENNETT LAKE MINING DIVISION.

Considerable activity has obtained in the Bennett Lake Division in the development of quartz claims, and the indications are that some of the properties will develop into valuable mines. Although the various mine or prospect owners were asked for information regarding their properties, but few have responded, so that I am unable to report in detail.

OFFICE STATISTICS—BENNETT LAKE MINING DIVISION.

I find that 13 locations and 26 certificates of work were recorded at Bennett.

REVENUE COLLECTED.

Free miners' certificates	$158 75	
Mining receipts	191 25	
		$350 00
Other receipts were:—		
Trade licences	$30 00	
Revenue tax	192 00	
		$222 00
Miscellaneous		85 00
Total		$657 00

This office was closed and the Division included in Atlin Division on and from December 1st, 1903.

CHILKAT MINING DIVISION.

Report of W. J. Rant, Mining Recorder.

I have the honour to submit the following report of mining operations in the Chilkat Mining Division for the year ending December 31st, 1903.

I regret to be compelled to report the decadence of mining in all its forms in this Division for the last two years, the cause of which may be attributed principally to the lack of transportation facilities and the discomforts to be endured by persons visiting the district, so that capitalists, so far, have not been induced to come in and look at the properties, no sales have been made, and consequently no work but that required by the Act to hold the claims has been done, while prospectors owning more claims than they can carry have been compelled to abandon from year to year, until only about one-third of the claims originally staked in the Division are at present in good standing. I more particularly refer to the Rainy Hollow district, which by the recent decision of the Alaska Boundary Commission appears to be the only discovered mineral ground remaining to British Columbia in the Chilkat Mining Division.

Placer Mining.

Placer mining by individuals is practically dead in this division, the whole of the once promising Bear creek having been abandoned. Difficulties of working caused by high water and quicksands discouraged the prospectors, so after two years' work they gave it up. During this summer a party of four from Juneau have been thoroughly inspecting the creeks, and seemed hopeful when they came out in the latter part of September that something might be done. Subsequently their leader, Mr. R. Saunders, returned with two experts and again looked over the creek; they decided that the only way of working to advantage would be by hydraulics, and with this object in view Mr. Saunders is applying for a lease and proposes putting in a plant next spring.

A dredging lease of five miles of the Klehini river, from the mouth of Porcupine creek towards Wells, has been applied for by Mr. Clarence Berry, of Dawson, who has had an expert in here prospecting the bed of the river. This should prove a successful venture, Porcupine creek having turned out gold in paying quantities for the last four years. I regret to add that we lose this ground also by the Alaskan Boundary Award.

Office Statistics.

Free miners' certificates issued	52
Locations recorded	19
Certificates of work recorded	20
Placer lease applied for	1
Groupings filed	4

Revenue.

Collections have been falling off continually in this district since 1890, in consequence of which the Government has decided to abolish Wells as a Recorder's Office from this date. In any case the office will have to be moved, as Wells falls to the United States.

NORTHERN PORTION OF CASSIAR DISTRICT.

(INCLUDING TESLIN, LIARD AND STIKINE MINING DIVISIONS.)

Under date of the 30th December, 1903, the Gold Commissioner of the District, Mr. James Porter, reports as follows:—

I am not able to report a very marked improvement in the mining industry, although when comparing the season's operations with those of the past year (1902) an advance is perceptible, as shown by the yield of gold, which may safely be placed at $35,000 for 1903, an increase over last season's output of nearly $20,000.

In the early part of the summer two miners from Atlin outfitted at Telegraph Creek, and with the aid of pack-horses proceeded over what is known as the Ashcroft trail to the Second South Fork of the Stikine river, spending some time there in prospecting for gold. When they returned in the fall they did not record anything, but they seemed to be very well satisfied with the country, for they assurred me that they intended returning there better equipped as soon as it is possible to travel next spring. The locality is one that has so far received but little attention, and it is to be hoped that it will in time prove to be of some worth. Other than this, but little outside prospecting has been undertaken here this season, the prospectors, as a rule, having confined their labours to the already discovered localities.

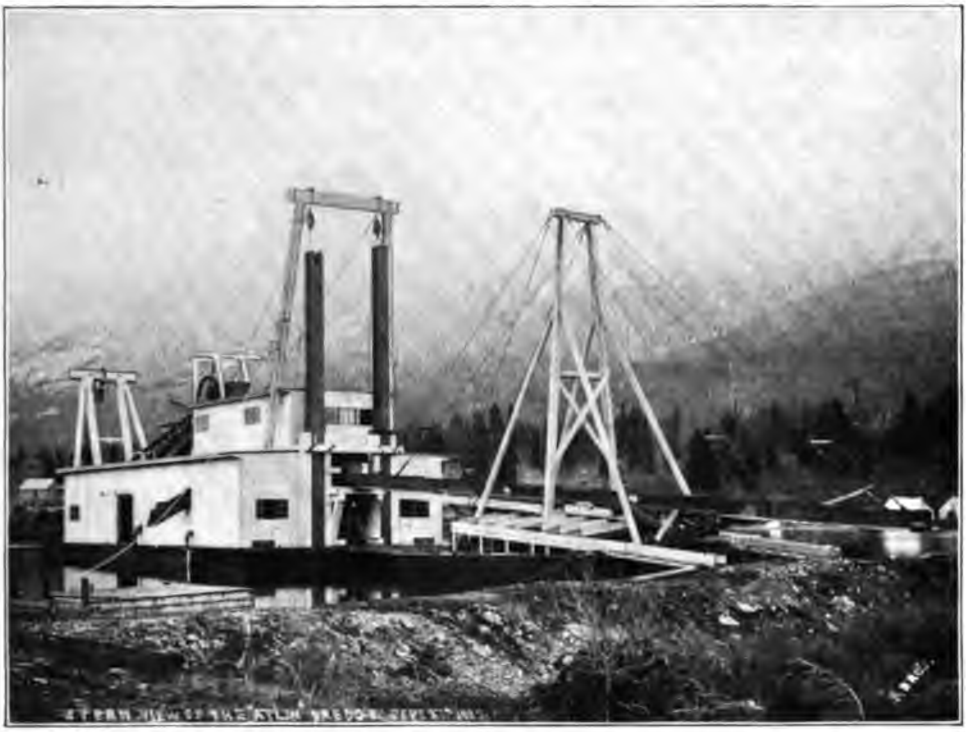
One creek and five hydraulic leases have been granted during the season, but not yet executed. They are situate on Dease creek, near its entrance to Dease lake. The ground covered has since early days been considered rich, but owing to the many obstacles standing in the way, such as drainage, the excessive expense that would necessarily have to be incurred in reaching the locality with suitable machinery, &c., &c., it has remained idle all this time. I feel confident that when machinery can be put on the ground for anything like reasonable cost there will be a large amount of gold taken from the hills that now hide the old channels of Dease, Thibert and McDame creeks.

THIBERT CREEK HYDRAULIC MINE.

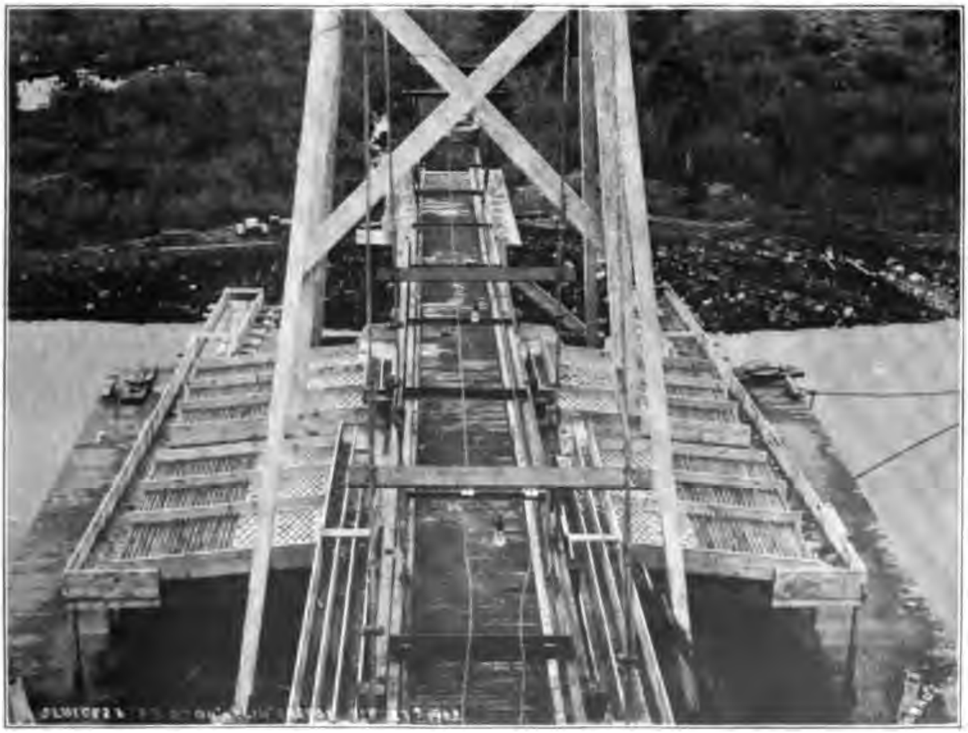
NOTE BY PROVINCIAL MINERALOGIST.—Mr. Alex. Hamfield, the Manager of the Thibert Creek Hydraulic Mine, has kindly placed his official report of the season's work at the disposal of the Provincial Mineralogist, and by permission the following extracts have been made therefrom:—

"The Thibert Creek Mine is on an old river channel on the south side of the modern creek, following the same general direction west to east. From the junction of Berry creek for about two miles it has not been touched by the present stream, but remains intact, and here are situated the seven claims, each 1,500 feet long, or a total of 10,500 feet, which comprise the mine. It is hard to give any exact measurements of its width and height, but judging from where we have worked at the upper end, and where the channel has been exposed in two places at its lowest portion I should estimate it to have an average width of 400 feet, and a height, which of course varies greatly in places, of something over 100 feet. Our work has been done on one of the most difficult portions of the channel, the banks now being 150 feet, where a large part of the overlie was composed of mud and boulder clay. This latter does not show anywhere else, gravel taking its place.

"The present water supply comes from Berry creek, which carries from 2,000 inches during the spring freshet and as little as 500 inches in extreme low water. Besides these there are four more—but smaller—water rights granted by the Government, not yet utilised. The water is carried to the mine from Berry creek, by a flume 1¼ miles long. Its size is 30 inches



ATLIN DREDGE—STERN VIEW, SHOWING TAILINGS STACKER.



ATLIN DREDGE—SHOWING DETAILS OF GOLD-SAVING TABLES.

by 30 inches, on a grade of 40 feet to the mile, with a capacity of 1,000 miner's inches in 24 hours, giving a head of about 300 feet from intake of pipe-line to the bedrock in the mine.

"The height of bedrock in the old channel to the modern creek is 85 feet at the upper end of the mine, and increasing down stream. The valley of the present Thibert creek is from 400 to 600 feet wide, and as the mine is opened up by cuts into the side of the old channel, there is always plenty of dump for tailings and grade for cuts. The cuts through which the gravel is washed are at present three, in which the sluices for the saving of gold are set. The latter are 5 feet by 3 feet, paved with wooden blocks 12 inches high, and run on a grade from 9 to 11 inches.

"The equipment consists of: 2,000 feet of No. 13 B. W. G. pipe graduated from 14 to 10 inches, with necessary elbows and Y branches; two No. 2 monitors; two No. 4 monitors (ball-bearing); two valves for 12-inch pipe; two valves for 10-inch pipe; five rock cars; one saw-mill, capacity 6,000 feet per day; one 20 horse-power boiler; one 15 horse-power engine; one blacksmith outfit; a certain quantity of lumber, hardware and supplies, and a few buildings. One miner's inch = about 1.5 cubic feet of water per minute. One working day means 24 hours.

"During the two previous years washing was carried on for about 100 days, with from 200 to 500 inches of water—450 inches can probably be set down as a fair average per day—and during this time $13,500 worth of gold was recovered, or 30 cents per miner's inch. This is less per inch than recovered this season, but when we remember that during a great part of this time the water was used for opening up the mine, it can readily be accounted for. When starting on a side hill, as we did, where no previous work of any kind had been done, it will be easily understood that water can not be utilised to its best advantage, and that when as small a head as 200 inches is used, the efficiency of the inch is immensely reduced. It is almost impossible to give a correct estimate of the cost of production during this time, as it was so much mixed up with the cost of construction and other work. However, the running expenditures were about covered by the $13,500 gold taken out.

"Statement of operations for the year 1903: Number of days worked (1 day = 24 hours), 98; amount of water used per 24 hours, 475 miner's inches; total of water used during season, 46,550 miner's inches; amount of gold recovered during season, $*; working cost for one year, $17,400; profit per one year, $*; working cost for $1 of gold recovered, $0.83; profit for $1 of gold recovered, $0.17; amount of gold recovered per miner's inch, $0.45; working cost per miner's inch, $0.37; profit per miner's inch, $0.08; approximate amount of gravel moved, cubic yards, 162,925; approximate amount of gravel per miner's inch, cubic yards, 3.5; approximate value of gravel per cubic yard, $0.13.

"The shortness of the season's run—98 days—is accounted for by two facts. First, because the pipe-line not being laid, machines or valves not set, washing operations could not commence until June 13th. Second, because after the last clean-up, which took place the first days of October, we did not desire to incur any more expense for this season, from which profits could not have been derived until next year, and therefore we closed down earlier than necessary.

"If the mine were put into proper working shape, it would be quite possible, when pipe-line and machines are in place, to commence washing not later than May 20th. It will always be necessary to have the final clean-up about October 1st, as, on account of cold weather, bedrock and cuts cannot be picked or cleaned to advantage after this date, but there is nothing to prevent the washing of gravel to continue until the 20th of November. The best plan to adopt would be to so arrange it that the first two weeks in the season were devoted to washing off the top dirt. This would only require a few men, who could be picked up in the country. When the bulk of the working crew came in, which would be in the commencement of June, the heavy ground (bottom with boulders), should be attacked. After the last clean-up, this crew could then be sent out, and only the original men retained, when the last two weeks would again be devoted to running top gravels. It would thus be possible to get a working season of 150 days with the smallest amount of expense.

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*Note by Provincial Mineralogist.—The amount of gold recovered and the profit made are withheld, inasmuch as the property is worked by a private syndicate to which alone this information belongs. I am enabled to say, however, that a material profit was made, which, considering the conditions, was a very handsome one.

"The small amount of water used (475 miner's inches per 24 hours) was caused partly because half the time we were obliged to work with only one of the small monitors, and partly from the fact that the season's water supply was very short. We have two large monitors, capacity 600 inches each, and two small ones, each 400 inches. By being compelled to work the small ones half the time, we, of course, lost a great deal of water during the time when the supply was good. In my five years' experience in the country I must admit that this has certainly been the worst one for water, and even old inhabitants, who have been here for 25 years, say that it has been the driest they have known. This is very unusual for this country, as the watershed here can really be considered very good. It is to be remembered that so far we have done almost nothing to improve the water supply in Berry creek, either by leading other creeks into it, or by building dams so as to preserve what water there is, but are entirely dependent on the natural flow. Therefore, a great deal, from two to three times as much as we can use, goes to waste during the first two months of high water, and even later in the season when we have rains we can, of course, only use a 'head,' and the balance has again to run down the creek. Our present supply (475 miner's inches) is now altogether inadequate, when we have to wash banks as high as 150 feet. For this purpose we ought to have not less than 1,000 inches and as much more as can be got. There are three different propositions for supplying the mine with water, each one quite feasible from a topographical standpoint and within the limits of a reasonable expenditure of money. By having longer sluices and perhaps a series of undercurrents a closer saving of the gold could be effected.

"No saving was attempted of the osmiridium of which there is a certain amount present. This should and could easily be remedied if the mine were put in a better working shape, for it is often in the close saving of gold that profit becomes possible.

"Although operating with an entirely insufficient supply of water during a very short season, and labouring under other disadvantages, such as bad grades, we have still managed to make a small profit. If the mine was worked on a scale commensurate to its size there would be effected a very large saving in the expenses for each dollar of gold produced, so much so, that this saving would in itself be a very good profit, even if none had been made under present conditions. The body of gravel is quite large enough to ensure the life of the mine for a lengthy period, even when worked on a large scale."

A very large portion of the Cassiar District is but little known, and there exist new fields for the prospector that have never yet been entered by white men. The great necessity of the district is the advent of railways and transportation facilities.

Nothing other than the usual amount of assessment work necessary to hold them has been done on any of the mineral claims in this district during the season, and no new locations have been recorded.

SKEENA RIVER MINING DIVISION.

(A Division of Cassiar District under the jurisdiction of the Victoria Gold Commissioner.)

REPORT BY JOHN FLEWIN, MINING RECORDER.

I have the honour to submit herewith my report on mining matters in the Skeena Mining Division during the year 1903:—

Development work has been confined chiefly to Princess Royal island, Gribbell island and the Kitimat and Portland canal camps. Considerable prospecting was done at a number of different points in the district, several very promising locations having been made in the Bulkley river, Portland canal and Kitimat camps. On the whole, there has been less activity than during the previous season.

PRINCESS ROYAL ISLAND.

Under the management of Mr. Tweedie, extensive development work is being prosecuted on the *Princess Royal Group*, shipments of ore being made from time to time to the Crofton smelter, Vancouver Island. The values continue to range high, the net smelter returns being very gratifying. About 20 miners have been steadily employed during the season, the ore being packed from the mine to Surf inlet on horses, and thence shipped by C. P. R. steamers to the smelter.

The *Thistle*, *Rose* and *Norah* mineral claims have been surveyed during the year for the owners, preparatory to applying for Crown grants.

On the *Bay View*, *St. Patrick* and *Teddy* mineral claims, Mr. Geo. A. Kelly has run a tunnel 25 feet in length and increased the depth of the shaft 15 feet.

A shaft 30 feet in depth, with a cross-cut of 10 feet at the bottom, has been sunk on the *War Eagle Group* by Mr. W. B. Morse.

GRIBBELL ISLAND.

On the Gribbell Island Copper Co.'s property nine miners have been continuously employed since last May. Two small prospect shafts were sunk on the vein and the manager, Mr. Steel, then concluded to drive a 5x7 foot tunnel at a depth of 250 feet to tap the ledge. This tunnel is now in 260 feet, and it is expected that the ledge will be struck in a short time, a cross lead carrying gold values having already been encountered. Six thousand dollars have been expended to date on this property.

The Canadian-American Development Company has accomplished a large amount of work on its property during the season. It is now engaged in putting in wharf and tramway facilities, and expects to be shipping ore in a very short time.

KITIAMAT ARM.

On the *Golden Crown Group* Messrs. Steele and Dunn have recorded the following work: One open cut 16 feet long, 32 feet deep and 19 feet wide, in rock and earth; one tunnel, 4 by 6½ feet, a distance of 10 feet in rock; one open cut 25 feet long, 12 feet wide and 12 feet deep, in rock and dirt.

On the *Paragon* and *Pioneer* mineral claims, the same owners have run one open cut 35 feet long, 7 feet wide and 8 feet deep, in rock and dirt.

On the *Peerless* claim the same owners have run one open cut 7 feet long, 8 feet wide and 5 feet deep, and one open cut 14 feet long, 20 feet wide and 12 feet deep, both in rock and dirt, and have also stripped the ledge 50 by 15 feet.

On the *Alabama Group*, consisting of the *Alabama*, *Arizona*, *Virginia* and *Kentucky* mineral claims, Messrs. Mooney and Pettigrew have performed the following work :—Run one open cut 20 feet long, 10 feet deep and 5 feet wide; one open cut 20 by 12 by 5 feet; one open cut 15 by 5 by 4½ feet; stripped the ledge 30 feet long, 20 feet wide and 5 feet deep at one point, and 15 feet long, 5 feet wide and 5 feet deep in another place, all in rock and dirt.

On the *Arkansas* and *Florida* mineral claims, same owners, the work consists of the following :—One open cut 29 feet long, 10 feet wide and 4 feet deep, and one 10 feet long, 5 feet wide and 8 feet deep, both in rock and dirt.

At Iron mountain, about 15 miles up the Kitiamat valley, the Lindeborg Brothers have done the following work on the *Bullion* and *Bimetallic* mineral claims :—Run one open cut 20 feet long and 10 feet deep, in rock; one tunnel 10 feet; one cut 8 feet; one tunnel 24 feet, and one open cut 8 feet.

On the *Mountain Goat*, *Lucy* and *Sarah Jane* mineral claims, situated on Gardiner's inlet, the owners, Messrs. C. A. Conlee and Jos. Hilton have run one tunnel in solid rock 4 by 6½ by 20 feet long.

QUEEN CHARLOTTE ISLANDS.

On the *Margaret* mineral claim, on Moresby island, owned by Mr. James Raper, the following work was done :—One open cut 24 feet long, 4½ feet wide and 11 feet deep at the face, and one 5 by 8 shaft 10 feet deep.

The *Skincuttle Entrance*, *Golden Gate* and *Trust* mineral claims, also on Moresby island, owned by Messrs. Heino & Hendrickson, of Extension, B. C., are now under bond to Seattle parties, who intend, if possible, to ship ore early in the coming season. The following work has been performed on these claims :—One shaft sunk 30 feet; one shaft 17 feet; one tunnel run 30 feet and one tunnel 7 feet.

The *McGuire*, *London* and *Morning Star* mineral claims were located early in the season on Gumshewa inlet by Mr. David Yule, on a ledge showing values in copper and zinc blende.

KITSILAS CANYON.

In this camp only statutory assessment work has been done during the season, on the following claims :—*Great West*, *Northland*, *Helma*, *Monte Christo*, *Ruby*, *Golden Crown*, *Strathcona*, *Granite*, *Toulon*, *Bull Dog* and *Montezuma*.

LORNE CREEK.

In this camp very extensive work has been done on the property of the Dry Hill Hydraulic Company, under the management of Mr. F. E. Holt. The company has completed its large flume from the dam at the falls on Lorne creek to the claim, which should give all the water required to work the property. A short run was made and a very gratifying clean-up secured. Everything is now in splendid shape for the coming season's work, and the company is looking forward to a handsome return on its investment.

The Hardscrabble Company, organised by F. R. Blochberger, of Rossland, has also commenced work on its hydraulic proposition, but most of the season was consumed in organising, prospecting the ground and making estimates for work for the coming year.

It is anticipated that another hydraulic company, now in process of formation by Mr. Jno. P. Fults, Jr., of Fairhaven, will also shortly commence operations on the creek. Taken altogether, the future looks very bright for this old abandoned placer camp.

BULKLEY RIVER.

In this camp statutory assessment work has been performed on the following claims :—*Telkwa*, *Naiad*, *Daisy*, *Oread*, *Discovery*, *Eldorado*, *Big Blue*, and *Surprise*.

A new discovery of high grade copper ore was made during the season by two Montana prospectors, Messrs. Hunter & Estib, who recorded seven claims on Goat creek and an unnamed tributary of the Telkwa river. The locators (who are old prospectors) say they never saw finer prospects in any camp they had previously worked in, and they have returned to the United States to interest capital in their discoveries.

PORTLAND CANAL.

The past season has seen a large number of prospectors in this camp and considerable development work done, besides some 40 miles of trails cut, and houses built on various properties. Still, with all the prospecting done, there is a large extent of this vicinity which has never yet been entered by a white man. It is expected that this will develop into an important camp before many years, the geological formation and general conditions bein reported as exceptionally favourable. From the *Stewart* ledge, at the head of the canal, to the placers and valuable mineral locations, situated on the tributaries of the Unuk river, the distance in a straight line is only about 40 miles, a large glacier separating the two camps. The general impression is that the mineral belt extends from the *Unuk* ore body, under the glacier, to the head of Portland canal.

The Portland Consolidated Company's property consists of 18 claims, divided into three groups. They are located near Maple bay on the Burniston range of mountains. At this point on the canal the distance across to Observatory inlet is only about 7 miles, the *Bonanza Group* of mineral claims being situated on the latter directly across the range. In addition to trails cut and houses built, the following work was done:—One open cut 20 feet long, 7 feet wide and 6 feet deep, in rock and slide; stripping 20 feet; No. 2 tunnel, faced up; No. 1 tunnel, driven 25 feet. The assays on this property range from $20 to $80, an average sample across the ledge at the end of the tunnel giving a return of $30 per ton, principally in copper. The main ledge is very distinct, standing almost vertical in the centre of Mount Alexandra.

The *Roosevelt Group*, consisting of the *Roosevelt No. 1* and *No. 2*, *Pontiac Miller* and *Northern Belle* mineral claims, the property of Messrs. G. Chambers, J. E. Stark and D. J. Rainey, is situated on Bitter creek, fifteen miles from the head of the canal. Although the surface showing of the ledge is small, it gives good values in gold and copper. The owners have had a gang of men working all the winter driving a 200-foot tunnel on the main ledge. This property is under bond to Mr. M. K. Rodgers.

The *American Girl*, *Mountain Boy*, *Northern Belle* and *Hard Money* mineral claims are situated on American creek, a tributary of Bear river, 20 miles from salt water, and are owned by Messrs. F. P. Stewart, M. I. Stewart, Jno. Conway and H. W. Brightwell. This property has a very large showing of high grade galena and copper ore, assays going as high as $600 to the ton. Nearly every sample shown me on my visit to the camp contained free silver in considerable quantities. This ore also assays well in gold. The owners were occupied most of the season in cutting a trail from the head of the Canal. The following work was also done:—One open cut 35 feet to tap the ledge, the width of the cut being 12 feet at the mouth and 25 feet along the ledge, with a depth of 25 feet at the ledge.

OBSERVATORY INLET.

In this camp statutory assessment work was performed on the *Bonanza* and *Hidden Creek Groups* of claims.

A new location was made on Alice arm in October last by Messrs. Roundy & Nicholson on a ledge carrying galena and zinc blende.

UNUK RIVER.

The Unuk River Syndicate, consisting of Messrs. Ketchum, H. T. Ceperley, F. W. Rounsefell, Thos. E. Atkins, Gordon Drysdale and the British American Development Co., deserves great credit for the persistent manner in which it has been developing this camp, in the face of the great difficulties and large expense of getting in supplies. In describing this camp, I cannot do better than quote from a letter written me by Mr. D'Arcy Macdonald, Deputy Mining Recorder for Unuk river, during the past season:—

"On the 5th day of April, 1903, we left Ketchikan, there being a party of five of us, who were all in the employ of the syndicate. On the morning of the 6th we reached the mouth of the Unuk river, which empties into Burroughs bay, on the Alaskan coast, about 70 miles north of Ketchikan. The outfit consisted of the usual supplies for such a trip, our means of transportation being two 30-foot boats, each boat having about a ton of supplies. Our means of getting up the river was by two men towing the boat with a line and another man at the boat's bow keeping her into the deepest water. After getting up the river some 35 or 40 miles in this manner to the mouth of the South Fork, we sledded the supplies some 10 or 12 miles up the latter stream to what is known as the South Fork property of this syndicate, where we spent 16 days surveying the group for Crown-granting. It took us 15 days to reach this point from the mouth of Unuk river. We then returned down the South Fork by sled and went on to Sulphurets creek, where the syndicate's *Cumberland* group of claims is situated; this group we also surveyed.

"After ascending the Unuk for a distance of 30 miles from its mouth, we crossed the granite formation, and it is about here that the International Boundary Line runs between Alaska and British Columbia.

"Leaving the granite, the next formation we encounter is a green stone or serpentine, which extends up the river for some miles, where it forms a contact with a dolomite. At the contact, which has a south-easterly trend, the ledges of the different ores occur, having in nearly all instances a quartz gangue, except where the solid lead of galena ores occur. There are also some irony dykes running parallel with the contact, which give fair assays in gold. Along the South Fork we found some splended float specimens of stephanite and other high grade silver ores, which apparently did not come from very far, and no doubt, with prospecting, ledges of these minerals will be found. Already some chutes of this ore have been encountered on the *Cumberland Group.*

"Above the latter group, on Sulphurets creek, there has been considerable placer mining done, with varying success. Mr. Ketchum, who has been making annual trips in here for the past eight years, assures me there is a coarse gold in this creek, he having got nuggets which were worth as high as $8.50, but the great difficulty is the water, which is so high in the summer months that it is impossible for an ordinary prospector to work the ground. Apparently, the only feasible way would be to outfit in October and go in and work during the late fall, winter and early spring, which would be a very trying experiment for two or three men. The country abounds in game and furs. Both grizzly and black bear are plentiful, and I have seen as many as five in one herd.

"If there were a trail or road into this vicinity there are unquestionably mineral leads which are worthy of development, in addition to the very favourable expectations of good placer or hydraulic ground, and it is believed that the prospects of the district would be assured was the transportation problem solved.

"The following are some of the assays made by Mr. Ketchum from the South Fork claims:

"No. 1.—Pyritic ore—silver, 13 oz.; gold, $40 per ton.
"No. 2.—Steel galena—silver, 12 oz.; gold, $20 per ton; lead, 23 per cent.
"No. 3.—Complex ore—silver, 17 oz.; gold, $18 per ton.
"No. 4.—Galena—silver, 36 oz.; gold, $20 per ton; lead, 59 per cent.

"Picked samples from the camp have assayed:—

"Chalcopyrite—Copper, 32 per cent.; silver, 68 oz.; gold, $122 per ton.
"Gray copper—Copper, 16 per cent.; silver, 5,000 oz.; gold, $1.75."

Mr. John W. Daily, of Danville, Ill., has a bond on the *Cumberland Group* of claims, and is now constructing a waggon road from tide water up the river to this property.

The following work has been done in this camp:—On the *Cumberland Group* one tunnel has been run, dimensions, 5 by 6 feet, 50 feet long, timbered; one 5 by 6-foot tunnel, 37 feet long; one open cut, 5 feet wide, 5 feet long and 3½ feet deep; six open cuts, 5 feet wide, 7 feet long and 4 feet deep, all in solid rock. On the *South Fork Group*:—One cross-tunnel, 5 feet by 6 feet 2 inches, 60 feet long; seven open cuts which will average 7 feet wide, 6 feet long and 4 feet deep, faced up for tunnels. There is a portable stamp-mill, run by water power, on this property, with canvas concentrating tables for practical sampling. In addition, there are several miles of trail cut by Mr. Ketchum; also good cabins, blacksmith shops and ore bins built on both properties.

OFFICE STATISTICS—SKEENA MINING DIVISION.

Number of free miners' certificates	142
" mining claims recorded	100
" certificates of work	131
" conveyances	49
" certificates of improvements	13

Revenue Collected.

Free miners' certificates	$ 663 50
Other mining sources	738 65
Total	$1,402 15

CARIBOO DISTRICT.

CARIBOO AND QUESNEL MINING DIVISIONS.

REPORT BY JOHN BOWRON, GOLD COMMISSIONER.

In submitting my twenty-ninth annual report upon the mining industry of Cariboo, I have the honour to say that, in so far as the result of the season's operations are concerned, it has been one of disappointment. The heavy rain which commenced about the end of June and continued nearly the whole balance of the season, had a most deleterious effect upon mining operations, as, while it did not come soon enough in the spring to be of any material benefit to most of our hydraulic companies in their piping operations, they being chiefly situated so near the source of the water supply that they are dependent, in a great measure, upon the winter's snowfall to obtain a pipe-head under the requisite pressure, yet, on the other hand, this incessant rain had the effect of so saturating the ground that companies working the deep diggings were in some instances compelled to suspend operations. From this cause the extensive works at Willow river were closed down, as were the *Point* and *Van Winkle* claims on Lightning creek, which contributed so largely to the previous season's output, while all deep diggings were more or less prejudicially affected. True, a few of the hydraulic mines are so situated as to be benefited by these incessant rains, and had consequently a longer run than usual, but by far the greater number were obliged to shut down after an exceedingly short working season, sometimes not exceeding 20 piping days.

The season's experience has consequently revived the question as to the importance of going more generally into the construction of dams, to create reservoirs in which to store surplus rain water at a sufficient altitude for piping purposes, and this question is the more important from the fact that there are vast areas of auriferous gravels which cannot be worked profitably until the claims now holding first rights to the water are either worked out or abandoned.

In reviewing the past and present conditions of mining in this Province, one is impressed with the idea that the Cariboo District has yet a great future. Upwards of 40 years ago the district was annually making a large output of the precious metal, and has since, each year, continued to produce largely, yet to-day her transportation facilities are scarcely better than shortly after the first discovery of gold, while new mining camps have sprung into existence elsewhere and have been provided with either railway or steamboat communication.

Owing to our isolated position, much interest is manifested in regard to the construction of a second transcontinental railway, and even though the Peace or Pine River pass be adopted by the Grand Trunk Pacific Railway causing that company's proposed line to pass several hundred miles to the north of the present settled portion of this District, it is felt that this northern portion of the Province will shortly receive that recognition its undoubted latent resources merit, by the construction of a line from north to south, connecting the two transcontinental roads. At the same time hopes are entertained that, upon a more thorough survey and a better knowledge of its natural advantages becoming known, the more southerly Yellow Head pass of the Rocky mountains may yet be selected, which would bring the main line within measurable distance of these extensive gold fields, as also near the pastoral and agricultural lands of the District.

LAFONTAINE CAMP, LIGHTNING CREEK—CARIBOO MINING DIVISION.

CARIBOO CONSOLIDATED CO.'S SHAFT-HOUSE LAFONTAINE—CARIBOO M. D.

The recent discovery of an excellent pass through the Cariboo Mountains, between Tête Jaune Cache, *via* Goat river to Barkerville, which was unknown at the time the Canadian Pacific Railway surveys were being made, will, it is thought, have a very potent influence in deciding the company to adopt this line.

Fewer persons, perhaps, than for several years past have been actually engaged in mining in Cariboo this season, especially in productive mining. Many of those men who left the district in the fall to winter at the Coast cities, instead of returning in the spring, as is their wont, were attracted by the flattering reports of new discoveries elsewhere on the Coast, and followed the rush to the new fields, though doubtless with the intention of returning shortly. The closing down of the Cariboo Gold Fields, Limited, after some 10 days' run, owing to the wearing of the bearings on the bucket elevator, threw quite a number of men out of employment.

Notwithstanding these drawbacks, which although of a temporary nature, have had the effect of materially reducing the season's output of gold, I feel warranted from present indications in saying that, unless all signs fail, next season should witness a very large increase in the gold product of the District.

CARIBOO CONSOLIDATED, LIMITED.

M. Bailey, Manager.

The introduction and instalment of the large plant and equipment of the Cariboo Consolidated, Limited, at La Fontaine, on Lightning creek, is of such a nature and is apparently so well calculated to meet its requirements, that, provided no unforeseen contingency arises, it should mark an era in the working of our deep gravel mines.

Hitherto the total cost of taking out, washing and disposing of the gravel of a 10-foot set of timbers under ordinary conditions would cost from one to two ounces of gold, while with the improved appliances and under the system proposed by this company, it is believed that $10 to the set can be made to yield a profit, and should the company's expectations be verified upon a working test, it will be the means of rendering large areas of ground valuable which have hitherto been regarded as worthless. Descriptive of this company's works, the manager, Mr. Bailey, writes me as follows:—

"In accordance with your request, I herewith send you the desired information in regard to the operations of this company in developing its Lightning creek property by means of a bedrock shaft and tunnel to tap the deep gravels.

"Early last spring a complete system of bore-holes was put down, in order to ascertain the cross-section of the Lightning creek valley at a point about the centre of the *West of England* claim, one and one-half miles below Stanley. An American 'Well Works' jetting machine was used for this purpose. It was found that the greatest depth to bedrock from the present surface of the creek was 126 feet. Most encouraging prospects of gold were recovered from the bedrock gravels in putting down these bore-holes, and as soon as reliable data were obtained as to the location and depth of the channel, work was immediately started upon the necessary plant to open up and develop this property.

"The main shaft-house has been erected on the south side of the Lightning Creek valley, the floor of which building is about 35 feet above the creek level. It was necessary to construct a large cribwork of timbers and excavate well into the rim rock in order to secure foundations for this shaft-house. The building is a frame structure, 40 by 80 feet, with three wings, two 24 by 40 feet, containing the boiler room, machine shop, store room, employees' changing room and bath-room, and one wing 18 by 24 feet, in which is placed the dump boxes and sluice flume approach.

"A working shaft, consisting of pumping compartments 6 by 8 feet, and two hoisting compartments 4 by 6 feet each, has been sunk to a depth of 175 feet from the shaft-house floor level, leaving 10 feet for a sump. The main tunnel breaks out from the shaft at a depth of 165 feet. The size of this tunnel is 8 feet in width by 8 feet in height. The top of the sills in the tunnel are 1½ feet above the floor level, in order to allow drainage under same. Upon these sills are placed the rails for the double car track. The total length of this tunnel will be about 325 feet. Over 100 feet have now been run and good progress is being made.

"The machinery for operating the plant consists of the following:—Two 80 h.-p. return tubular boilers; one 30-h.p. loco. boiler; 8 by 10 inch double drum Hendrie & Bolthoff hoisting engine; 10 by 10½ by 12 inch Hendy air compressor; 36 inch by 12 feet air receiver; two 3¼ inch "Giant" air drills; 15 h.-p. high speed engine; Buffalo exhaust fan, 12-inch discharge; electric lighting plant; 100 h.-p. feed water heater; two feed pumps (boilers); 12 by 22 by 30 inch Ingles cross compound Corliss engine; two 18 inch diameter Cornish pumps; two steel cages with safety clutches.

"The camp buildings finished and in course of construction consist of the following:—Mess-house, two bunk-houses, foreman's cabin, company's office building, manager's house, four cabins for employees, stable and root cellar.

"The shaft-house, tunnel and camp buildings will be lighted throughout by electricity. The dynamo is at present furnishing light for the shaft-house and the work of wiring the buildings is now under way.

"All the machinery has been installed with the exception of the pumping plant, which is now being put in place. This plant consists of two Cornish pumps of 18 inch diameter each, with an 8-foot stroke running at a maximum of 12 strokes per minute. The pumps are driven by an Ingles 12 by 22 by 30 inch cross compound Corliss engine. This pumping plant was furnished by the Vancouver Engineering Works, of Vancouver, B. C., and reflects great credit upon the makers, both as to design and workmanship. These pumps will have a lift of about 140 feet, discharging into a drain tunnel that intersects the shaft 30 feet below the floor level of the shaft-house.

"A ditch 3,600 feet in length has been constructed from Lightning and Anderson creeks to bring water to the shaft-house, for the purpose of washing the gravels when mined. The dump box and sluice flumes are placed immediately. in front of the main shaft, so that minimum haulage from the shaft to the dump box is obtained.

"A reservoir 16 by 12 by 4 feet has been excavated in a small water-course on the side-hill back of the shaft-house, at an elevation of 140 feet above the shaft-house floor, and from this reservoir a 3 inch pipe-line has been laid, supplying water to the boilers, bath-room for fire protection, etc. All camp buildings are supplied with water brought in pipes from a small ditch constructed on the side-hill on the north side of the valley.

"A large force of men has been employed on this work since June 1st, when active construction was begun. At present the force consists of 40 men, under the supervision of Mr. Joseph Wendle, the superintendent of the mine.

"Unless unforeseen difficulties are met with in driving the tunnel, we should be in touch with the gravel in the deep channel of Lightning creek by the early part of February next.

"As soon as the first line of bore-holes was completed, the work was immediately commenced of taking another section of borings at a point on Lightning creek two miles below the present shaft, with a view to putting in another plant to develop the property. Six bore-holes were put down to bedrock, when the work had to be closed down on account of the winter season. The greatest depth to bedrock from the surface so far ascertained in these borings was 205 feet. Good prospects in gold were recovered, and the continuation of the gold lead of Lightning creek was proved beyond doubt. Active work will be resumed on these borings as soon as the weather permits next spring, and additional cross sections of the valley will be taken still further down Lightning creek."

During the past season this same company has also operated the *Lowhee* claim on Lowhee creek. Additional progress has been made in opening up the channel of Lowhee creek from rim to rim for 200 feet. The main sluice flumes have been continued 180 feet, making the same a total of 1,320 feet in length. Very little gravel "in place" was moved during the season's hydraulicing, as the material moved consisted mostly of headings and tailings from the old workings. These headings have now been practically worked through, and from now on the prospects for good returns are much better.

THE BEAR HYDRAULIC COMPANY, CUNNINGHAM CREEK.

B. A. Lasell, Manager.

This is a new hydraulic claim of much promise which has been opened during the past season. Mr. Lasell says:—

"This property, which is situated on Cunningham creek, was purchased by an American syndicate some six years ago. After working it a part of one season with a small plant using about 400 inches of water, and not being able to make it pay dividends from the start, as had been anticipated by the shareholders, the Company decided that it had been swindled, so refused to continue operations longer, and let the mine lie idle until last season, when it was purchased by two of its present owners, who prospected it by putting on a small hydraulic plant (the old one having been previously removed) and found, after making a clean-up, that the property was worthy of more than passing attention. During the early spring of the present year arrangements were completed for the installation of a moderately large hydraulic plant, which would be capable of handling 1,500 cubic yards and upwards of material per day.

"The old ditch which brought in water from Cunningham creek was, after a careful examination, considered to be too costly to maintain as a ditch capable of supplying the water required. Therefore, to insure a sufficient and steady supply of water for the entire season, it was decided to dig a ditch, with a carrying capacity of at least 1,500 miner's inches of water, from Antler creek, running down and through Cunningham pass, and thence across Cunningham creek by pipe-line to the mine, being a total distance of a little over four miles from the ditch-head to the pit. This work was started on June 18th, and included the erection of suitable camp buildings, the construction of 4-foot sluice flumes, and the laying of a 20-inch steel pipe-line 1,300 feet long, as well as the digging of the ditch, all of which work was completed on August 15th, the water turned through the ditches and pipe-line on that date, and the actual work of hydraulicing commenced in less than two months from the time of starting, which, for the equipment and installation of a plant of this size, is considered exceptionally quick time. Continuous piping was carried on until October 12th, when the season's clean-up was made, the result of which shows another dividend-paying mine to Cariboo's credit. As the gravel deposit is a very extensive one, this mine has a long working life ahead of it."

CHINA CREEK HYDRAULIC COMPANY.

B. A. Lasell, Manager.

I am favoured with the following report from Mr. Lasell:—

"As the result of a cold, backward spring and the snow not commencing to melt, hydraulicing was not begun at this mine until May 24th, thus cutting off about 14 days of an average season. Good progress was made throughout the season's run, which ended July 6th, or a total of 44 days of an actual water season, of which three days were lost in shifting pipes and monitor, making an actual run of 41 days for the mine, in which time 76,000 cubic yards of material were moved. The clean-up was a satisfactory one, and showed increased values in the gravel over the previous season's average.

"An exceptionally wet summer and fall made it possible to commence active operations again in the early part of September, and these were continued until the close of the season on October 25th. During this fall run about the same yardage of material was moved as was handled during the spring, which, when totalled up, makes the season's work a very creditable showing. The continuous rains made it impracticable to clean any of the bedrock piped off during the fall run; all of it, however, will be available for the coming season's clean-up, which will undoubtedly be a most satisfactory one to the company.

"As this property has all the natural advantages of an ideal hydraulic mine, as regards water supply, dump, and sluice grade, it makes it possible to work it at a very low cost per cubic yard of material moved, thereby cutting down operating expenses to a minimum, which greatly enhances the value of the property."

CARIBOO GOLD FIELDS, LIMITED.

W. Bromfield Brough, Manager.

I am indebted to the manager for the following brief but comprehensive statement, showing the present situation and purposes of this company:—

"In reply to your letter asking for information as to the operations of this company during the past season and its prospects, for use in your Annual Report to the Minister of Mines, I regret to have to say that, from no fault of any one connected with the company or in the construction of the elevating plant, other than the fact that the manufacturing engineers used soft metal for the bearings, which had no wearing power whatever, it was found necessary to shut down the mine after the elevator had worked 363 hours, owing to the rapid wear. It was impossible to clean up even from bedrock. Except as regards the material employed in the wearing parts, a fault which it is proposed to remedy, the present elevating plant seemed capable of doing the work that the company expect from it. The mine in every other detail is in the most excellent condition for working successfully. A new chain, comprising all the wearing parts, which have to be taken out, is now being manufactured, and the wearing power indefinitely multiplied by having removable and renewable bushings, made of hard manganese steel, inserted at the different bearings. If this precaution proves sufficient, there is no reason to be other than hopeful in regard to the future of the company, more especially as the further the work is carried up the creek, the better values will the gravel to be handled yield.

"This company holds also a large portion of ground on the creek which has not previously been drifted, and which may prove as valuable as that part which gave such large returns in the 'sixties.'

"The development of the property has been delayed, in the first place, owing to the initial advice from experts that it should be worked by an hydraulic elevator. Such an elevator is capable of good work where the supply of water is large, but where limitations exist, as in this instance, it does not make the best use of the water power available. It was on this account that, after a trial, the directors decided to erect a bucket elevator. The first elevator erected was destroyed by faulty design of the makers; the fault was apparently a trifling one, the fixing of a series of small set screws where they should not have been, and where they could do damage without attracting attention. These screws ruined the whole machinery, but in all other ways the elevator was a success and proves that the system is right, the details only wrong. It was unfortunate that the chain erected this season, to replace that so destroyed by the screws, should not have been made of proper material. We trust, however, that, these faults having been eliminated, good work will be done next season.

"I have to say that this company regrets the loss of the services of Mr. Melbourne Bailey who was resident engineer, and practically manager last year. Owing to his departure, the services of Mr. R. S. Robinson were secured as engineer, and the secretary of the company, Mr. W. Bromfield Brough, F. C. I. S., was appointed manager, and came out from London to take charge."

FOREST ROSE COMPANY.

W. C. Fry, Foreman.

This property, which is now owned by Messrs. Fry & Innes, has not been working for the past two years, owing, I understand, to some unsettled question regarding ownership. This matter having been adjusted, the company has resumed work this season. Regarding these operations, as also in relation to the Mucho Oro Company, of Stouts gulch, belonging to the same company, Mr. W. C. Fry writes:—

"During the past season this company operated two properties, one on Williams creek, and one on Stouts gulch. The Williams creek property is a hill claim known as the *Forest Rose*, consisting of 174 acres of real estate. This property has been continuously worked since the early sixties by drifting and hydraulicing in a small way, until three years ago, when work was suspended for a period of two years. Last season the claim was equipped with a new sluice flume 24 by 24 inches, 1,100 feet long and 1½ miles of ditch was enlarged to a carrying capacity of 500 miner's inches of water, with 500 feet of new flume 24 by 36 inches. Hydraulicing was carried on for ten weeks; about 70,000 cubic yards of material was moved, but, owing to the irregular bottom, only a very small piece of bedrock was uncovered, which, however, gave satisfactory returns.

"The Mucho Oro Company's property, situated on Stouts gulch, consists of 900 feet of the bed of the stream, 300 to 400 feet wide, together with 300 square feet at the mouth of Emory gulch. This claim was partly drifted with the most encouraging returns, in the early days, as high as 22½ ounces of gold being obtained from four feet square of bedrock. Last season a complete hydraulic plant was installed, but owing to the amount of work to be accomplished before the water could be turned on, only 17 days piping was obtained, the result of which more than reimbursed the outlay for the season."

The Wyoming Company, Stouts Gulch, making use of an artificial reservoir, was enabled to continue piping the whole season, and, consequently, did exceedingly well.

FIRST OF MAY COMPANY, WILLIAMS CREEK.

A. McPherson, Manager.

Of this company Mr. A. McPherson says:—

"The first wash-up for the season proved very satisfactory, so much so that the company decided to enlarge its ditch to four feet wide on the bottom, at a heavy cost, and a loss of nearly two months' work in the mine, there being such a heavy wash to contend that it cannot be moved without a large quantity of water. It is expected that during the coming season the claim will pay a very handsome dividend, and from all appearances it will continue to do so for many years to come."

MOUNT COMPANY, WILLIAMS CREEK.

F. J. Tregillus, Secretary.

Regarding this company's work the secretary says :—

"Work on the flume commenced in April, when the old 18-inch flume was made into a 2-foot one, and relaid, with a uniform grade of 7 inches to the 12-foot box. The Spring's water was not quite up to the average on account of the light snowfall, but with the aid of a reservoir built last year, and an exceptionally wet summer and fall, about twice the usual amount of ground was run off, and intermittent piping was kept up until the 4th of November. About 150 feet of the channel was exposed from rim to rim and cleaned. The average number of men employed was five. Most of the ground worked off this season had been drifted from a shaft by the original locators, which robbed the season's output of about $2,000, and this, with the extra expense entailed in altering the flume, had the effect of bringing the claim out a little behind financially. The ground to be worked next summer, however, is solid and, as everything is in good shape, good results are looked for."

SLOUGH CREEK, LIMITED.

John Hopp, Manager.

Mr. John Hopp, manager of the Slough Creek, Limited, and the Cariboo Exploration Company, Limited, of Burns creek, kindly furnishes me with the following particulars of these companies' operations :—

"Since the report of last year the workings from the end of the upraise, which was then being driven, consisting of small cross-cut drives, were extended as far as possible. This was accomplished by repeatedly changing from one place to another as the water would change its draining, allowing work to be pushed ahead in a comparatively dry face for short intervals until at last a full face of gravel was obtained. After encountering a great amount of water and heavy pressure about the first of February, the timbers in the tunnel and some of the cross-cuts were crushed so badly that it was impossible at this time to continue further operations at this point. It was then decided to drive the main tunnel from the shaft another 150 feet beyond the point at which the first upraise was made, and there commence a second upraise to tap the gravel in a second place, some distance away from the first opening. The grade of this second upraise was much lighter than the first, and gravel was reached at a distance of 170 feet from the main tunnel. Additional water was tapped at this point, pressure setting in which crushed the timbers, necessitating the temporary abandonment of the face. A small cross-cut was started back of this crushed face and gravel was reached through bore-holes in the roof. It was then decided to discontinue further work until the water had been drained.

"In February, 1903, an air test was made, with the object of ascertaining the probable pressure of the water flowing from the workings of the first upraise. The air locks were closed and an air pressure was put into the tunnel beyond the locks of 44 lbs. per square inch. This pressure had no effect in holding back the water. The pressure was then slowly increased, and it was noted that the flow of water was gradually lessened until at 61 lbs. per square inch the flow had been reduced over one-half. On November 3rd, after the work had been suspended in the second upraise, a further air test was made. At 46 lbs. per square inch the flow of water was reduced over one-half, thus proving conclusively that the water pressure had been reduced about 15 lbs. during the interval between these air tests. The water level in the deep channel has therefore been lowered by the steady pumping. It was then decided to discontinue all further attempts to extend the workings until the water had been drained. All the gravel so far obtained from the various openings and bore holes is a splendid wash, containing high gold values."

CARIBOO EXPLORATION CO., LIMITED.

Regarding this company Mr. Hopp continues:—

"The snow was shovelled from the ditches and the plant put in readiness to commence hydraulicing as soon as the water started, which ordinarily is about the first of May. This year, however, the season was very backward, the work did not commence until near the end of May, and after an unusually light snowfall there was a correspondingly small amount of water. The very warm and dry weather in June brought on a freshet and materially shortened the season. This was one of the shortest seasons in the history of the country. We only had 17 days of actual piping, and had barely time to clean up the pit. A fair amount of dirt was moved for the short time of working, carrying good values. As soon as the water ceased the mine was closed down. Later in the season there was considerable water from summer rains, but as there was no certainty of continuing for more than a few days work was not resumed.

"The mine is equipped with four miles of ditch from Jack of Clubs creek, and carries 1,600 miner's inches of water. The pipe-line is 2,400 feet long and of 30-inch, 22-inch and 15-inch diameter, with 280 feet head, using one No. 6 and one No. 2 monitor. Fifteen men were employed during the hydraulic season.

"The work carried on during the past four years has conclusively proved the value of the ground, and it is the intention of the company to enlarge the plant during the coming season, to render it possible to move a greater quantity of gravel during the time of active operation."

WILLOW RIVER MINING COMPANY, LIMITED.

F. C. Laird, Manager.

Regarding the operations of this company for the season Mr. Laird writes me:—

"In June the spring freshets came on with a rush and provided more water than the pumps could handle. Work was accordingly discontinued until the freshet was over. It was expected that operations would be resumed about the middle of July. However, the season proved to be such an abnormal one that no effort was made to resume work until December. Contrary to all precedent the highest water of the season was in September.

"The shaft (6 feet x 16 feet) has been sunk to bedrock. The work remaining to be done is to continue the shaft for about 15 feet and break out into the channel. As the gravel lying on bedrock is very hard, no further difficulty is expected. It is probable that this proposition will be a heavy pumping one at all times; however, the company seems to be well provided in this respect, as the pumping facilities consist of three 18-inch Cornish pumps, two working on an 8 and one on a 10-foot stroke. Two of these pumps are actuated by a 28-foot overshot water-wheel, having a 7½-foot breast, the third by a steam plant. Barring accidents, it should be but a short time until it is known whether all the time and labour has been spent for naught or whether the expectation will be realised and this will prove to be a paying mine."

ALABAMA AND WILLIAMS COMPANIES, MOSQUITO CREEK.

The Alabama and Williams Companies, of Mosquito creek, which have for so many years contributed largely to the gold product of the district, although having but a short working season, nevertheless gave promise of even better results in the future. The Flynn Brothers & Co. say briefly regarding these properties:—

"In regard to the work done on Mosquito creek claims, as you are aware, the season has been short, owing to the small quantity of snow, upon which we are dependent for our water supply, in consequence of which we only piped 21 days of two 10-hour shifts on the *Alabama* claim, with, however, very satisfactory results. Nine men were employed. This claim is now well opened and with a favourable season should give greatly increased returns. The *Williams* claim employed six men, and piping was carried on for 28 days of two 10-hour shifts, the expenses being $1,800. This claim, which we started to develop two years ago, is now well opened ; it possesses the advantages of having plenty of grade and dump, and can be rapidly worked while the water is on, and with the advantage of a reservoir which we contemplate building next season, our piping season should be easily doubled on this claim."

PLEASANT VALLEY, LIMITED.

L. A. Bonner, Manager.

Regarding this company's property, Mr. Bonner briefly informs me as follows :—

"Last spring a shaft was sunk to a depth of about 50 feet, when the water increased beyond the capacity of the pump. A Cornish pumping plant, with three times the capacity of the old plant, has now been installed, and the work of sinking will be resumed about the first of January. On account of the flooded state of the country around Barkerville it was deemed advisable to suspend operations until after frost set in."

DISCOVERY GOLD MINING COMPANY.

With regard to this company, Mr. Bonner continues :—

"A tunnel has been driven 900 feet to tap a hill channel on the right bench of Jack of Clubs creek. This bedrock drive will reach bore-holes, made last year, by the first of January. A shaft-house is now under construction, and a shaft will be sunk to the tunnel when completed."

THISTLE GOLD COMPANY, LIMITED.

James Ross, Manager.

This has been one of the best paying mines of the district this present season. Mr. Burgess, the assistant manager, in response to my inquiry, writes me as follows :—

"The Thistle Gold Company, Limited, under the management of James Ross, is this year able to report a very successful season for its property at Eight-Mile lake. Piping with a No. 2 monitor was commenced on the 13th day of May, and continued without interruption until October 29th. Owing to the exceedingly wet season, we were able to hydraulic day and night, except in the months of July and August. During the latter part of the season an extra line of pipe was laid, enabling two monitors to operate on the bank. A total of 44,600 cubic yards of material was moved, advancing the working face about 1,000 feet from the shore of the lake. Low pressure head and a limited dump made the use of powder absolutely necessary, both for bringing down the bank and for breaking up the boulders for handling. For this reason the amount of dirt moved was not as great as it otherwise would have been. The average number of men employed throughout the season was 15. In the fore part of the season the limestone bedrock was struck ; it showed a dip toward the lake of about one foot in three. The hardpan heretofore serving as bedrock is barren of gold, in so far as working it under existing conditions is concerned. I do not wish to make any specific statement regarding the amount of gold taken out this year. I will state, however, that the returns are considerably above our expectations. We look forward to an equally successful season for this property in 1904."

Coffee Creek.

Under the same management, the company operated its property on Coffee creek. This property, consisting of two leases of 100 acres each, is, as yet, in a state of development. The plant consists of one No. 2 monitor,

CHINA CREEK HYDRAULIC MINE—CARIBOO MINING DIVISION.

ALABAMA CLAIM, MOSQUITO CREEK, NEAR BARKERVILLE.

acting under a pressure of 180 feet. Piping was commenced on the 13th of May, and continued day and night until the 16th of June; about 10,000 cubic yards of material was moved. Development work on this property is slow, as all water owned by the company is necessary for the operation of the Eight-Mile Lake property, except during the spring season of the year.

The Waverly Hydraulic Company, Grouse Creek, J. Pomeroy, foreman, commenced operations about the middle of May and worked till the 1st of October, taking out 275 ounces of gold, six men being employed. The prospects for the future are excellent, and the claim should be profitable to its owners and last for many years.

McGregor, Thompson & Ross Claim, Cunningham Creek.

This is another claim on Cunningham creek upon which development work has been going on for several years and is now in so forward a state that in another year the property should be placed upon a paying basis. Mr. Thompson writes me:—

"Work progressed upon the rock flume during the winter and spring, being finally completed into the basin on June 1st, the force employed being 7 men. The remainder of the season was devoted to the opening of a pit at the mouth of the flume, the widening of ditches, and the grading of a rocky hillside for a foundation for a flume, as well as the erection of a cook-house and accommodation for ourselves. On November 1st work was suspended. Owing to a very wet season and our inability to handle the succesive high waters, no 'bottoming up' was done, and as the rim-rock was not of sufficient value to justify cleaning, the returns for the season were small. The work contemplated for the coming year is the erection of a bunk-house, the installing of a hydraulic plant, and the building of 1,000 feet of 3-foot flume. The mine will then be in perfect working order, and we trust that it will amply repay us for our years of labour and expense."

The National Hydraulic Mining Company, Quesnel River.

A. McPherson, Superintendent.

The superintendent says:—"This property is owned by a syndicate of Pittsburg capitalists having four leases on Quesnel river below the mouth of Beaver river. They have expended nearly $100,000 on the property, the largest item of expense being the building of five miles of flume, 4 feet wide by 3 feet deep, at a cost of $60,000; the lumber cost, laid on the ground, $50 per M, there being no timber in the vicinity for lumber or trestle work. There are 3,000 feet of pipe-line. Active operations in the pit were commenced on the 10th of July, 1902, and continued for 40 days, when it was found there was a reef of high rock along the river bank. As it was known that there was deeper ground further under the bench, the company decided to run a flume grade tunnel through the rock, 7 feet wide and 8 feet high; this tunnel was run 400 feet through very hard rock, all hand work. An incline was raised on a grade of 4 feet in 12. This was run 50 feet before breaking through into gravel. A shaft was sunk 80 feet deep to connect with the end of the upraise. Hydraulic operations commenced on the 2nd August, 1903, and in 50 days piping there was moved 100,000 cubic yards of gravel. The water used was 800 miner's inches. It was found that the back channel is still some 14 feet deeper than the head of the upraise, and the main tunnel run on its present grade will be 5 feet below the channel, as far as known. The gold in the gravel is very fine and hard to save, with a heavy head of water; there is gold all through the gravel, some strata carrying high values. Should there be found a fair per cent. of values in the bedrock gravel in the channel, the company will have a paying mine for many years to come. Sixteen men were employed during the past season."

COAL AND PETROLEUM.

Several licences to prospect for coal and petroleum have been issued during the year, but little has been done to exploit the ground so held.

RIVER DREDGING.

Nothing has been done during the year to further prove that this means of recovering the auriferous sands in our river beds can be pursued with advantage.

QUARTZ MINING.

Messrs. Baker and Atkins, backed, it is understood, by English capital, have devoted the season to an examination of the numerous quartz ledges in the vicinity of Barkerville. Having installed a complete assaying plant and laboratory at Barkerville, they have been engaged in making tests of the ore taken from a number of the most promising ledges, with a view to their future workings. It is believed that some of these tests made have proved most encouraging. On application, Mr. Atkins furnishes me with the following:—

"The working season of 1903 was chiefly spent in further investigation of the quartz properties on Burns and Island mountains. A great deal of work was done on Island mountain clearing out old tunnels, with a view to finding out why work was not more vigorously prosecuted. It is to be regretted that, after having such encouraging prospects as the oxidised surface ores afforded, no effort was made to sink on these reefs. Although tunnels were driven in every direction, some of them 400 feet long, not one proves the reefs below 50 feet.

"The phenomenal wetness of the season hindered the work of investigating these workings, and prevented much attention being given to the numerous outcrops known to exist on this mountain, which I suspect to have been the source of the rich placers of Mosquito creek below. Much valuable information was obtained under difficult circumstances, and while the results go to show lower grade ores than must have been obtained when the surface was worked, they were of a sufficiently encouraging nature to merit further investigation. Several of the old miners reported that tellurides had been found in the reefs, and to settle the matter definitely, a number of exhaustive tests were made, but in no instance was tellurium found; so this rumor is to be attributed to a lack of understanding on the subject.

QUESNEL MINING DIVISION.

HORSEFLY GOLD MINING COMPANY.

R. T. Ward, Manager.

The property of the Horsefly Gold Mining Co., commonly known as "Ward's Hydraulic," comprises the old Harper lease, Horsefly river. This is the only company of importance working at present in this part of the district, so far as I can learn. Mr. Ward writes me regarding the operations:—

"This season we have not worked any ground to bedrock, confining our operations to the top gravels to determine the values for the purposes of dredging, and the result has been highly satisfactory. One thousand feet south of our old workings we discovered a tight, black gravel overlying the blue gravel, carrying good gold and dipping about one foot in eight, and from present indications it promises to be extensive. We have worked into it 100 feet south, and 400 feet east and west. The gold is heavy and assays $17 per ounce, whereas our blue gravel gold assays $17.60 per ounce. This gold carries over 1 per cent. platinum.

"Last winter, half a mile north of our old workings, we opened a shaft 70 feet to bedrock and drove a tunnel 30 feet west and 80 feet east on the bedrock, prospecting with rocker all gravel taken out. For three feet above bedrock the gravel yielded $3.25 per cubic yard; the next three feet yielded 60 cents per cubic yard. This should pay for drifting with suitable machinery for hoisting, and could be worked on an extensive scale. The amount of water percolating through the blue gravel is very trifling, not worth mentioning. All our work this year has been prospecting, during which time we have recovered about $6,000 in gold.

"I am not prepared to say at this time what our company will do next season. At our annual meeting I will more fully report to them the result of our prospecting. One thing is certain, we shall have to get some plan to handle more gravel. As it is now, our elevators work well, but the quantity of gravel washed is not in proportion to the amount of water used. We run 1,200 inches through the elevator nozzle, and 600 to 800 inches through the monitors. The monitor water with the seepage from the river, which has to be hoisted to the flumes on top, is equal to about 600 tons for each ton of gravel washed."

CONSOLIDATED CARIBOO AND HORSEFLY HYDRAULIC MINING COS., LTD.

J. B. Hobson, Manager.

I regret my inability to furnish reliable information respecting these two large enterprises, owing to the absence of the manager.

NOTE BY PROVINCIAL MINERALOGIST.—A full description of the Consolidated Cariboo Company, which is unquestionably the most important hydraulic mining enterprise in British Columbia, will be found in the report of last year (1902). The following summary of the season's operations for 1903 is taken from the annual report of the company, recently issued:—

"The past season turned out a most disappointing one, for the reason that the 26 inches of well-settled snow that laid on the watershed at the end of March went off mainly by evaporation under the influence of the cold frosty weather, accompanied by the northerly winds that prevailed during the months of April and May; and afforded barely sufficient water to operate the mines 53 days and 7 hours, with a quantity of water varying from 2,000 to 2,500 miner's inches, being 12 days and 8 hours short of the time run during the season of 1902, 50 days and 18 hours short of the washing time reported for season of 1901, and 118 days and 6 hours short of the washing time reported for season of 1900.

"About half the washing time was applied to the excavation of the rocky cuts required to accommodate the right and left branches of Sluice No. 1, which were advanced 740 feet on the right and 704 feet on the left side of the excavation.

"The second run, commenced on the 21st day of July, included a period of 8 days, ending with the exhaustion of the water supply on the 1st day of August. During the progress of the run 16,000 miner's inches were used to wash out about 12,000 cubic yards of slide rock that came into the excavation from the south-west rim, and 44,000 cubic yards of gravel from the main bank, making a total of 56,000 cubic yards for the run, from which was recovered $523\frac{24}{100}$ ounces of gold, valued at $8,910.76, an average yield of $20\frac{25}{100}$ cents per cubic yard for the 44,000 cubic yards of gravel washed from the main bank. The right-hand branch of sluice No. 1 was advanced 45 feet, making the advancement of sluices amount to a total of 1,489 feet for the season.

"The result of the second run is encouraging, and indicates a continuation of the high-grade deposits that gave such satisfactory results prior to the season of 1901, when enormous deposits of slide rock from the rims were found replacing large areas of the high-grade strata composing the main body of the fill found between the rims of the ancient river.

"The light gold output may be laid to the short water supply, the working time lost in removing large masses of slide rock, encountered while carrying the workings up stream, and excavating cuts for advancement of sluice branches.

"SUMMARY OF THE SEASON'S MINING OPERATIONS.

"Total time occupied in washing in pit No. 1	53 days, 7 hours.	
Total quantity of water used	127,083	miner's inches.
Quantity of gravel, clay and rock washed:		
Gravel from third bench	248,000	cubic yards.
Gravel from main bank	44,000	〃 〃
Slides from rims of old workings and indurated volcanic mud	68,000	〃 〃
Bedrock slide	12,000	〃 〃
Total quantity washed	372,000	〃 〃
Average duty of water per miner's inch	$2\frac{92}{100}$	〃 〃
Gold product for season	2,639.09	troy ounces.
Value of gold	$44,943 70	

The receipts and expenditures attending the operation of the company's mines for the season will be found distributed in detail in the following statements:—

"MINE OPERATING EXPENSES FOR 1903.

"EXPENDITURE.

"Mining Account:—		
Mining	$18,330 22	
Excavation for sluices	8,703 00	
		$27,033 22
"Explosives:—		
Mining	$7,418 15	
Excavation for sluices	7,120 00	
		14,538 15
Sluice maintenance and extension		9,449 80
Portable hydraulic plant maintenance		37 33
South Fork ditch maintenance		2,870 28
Morehead ditch maintenance		2,815 84
Camp maintenance		1,189 59
Mine and camp light maintenance		398 46
Waggons and harness maintenance		144 07
Telephone maintenance		77 57
Prospecting account		729 22
Stationery and printing		283 47
Postage and telegraph		134 34
Incidental expenses		11 40
Lands and leases (lease purchases, rentals, etc.)		5,267 30
Licence account (free miner's certificates)		110 00
Fire insurance		803 00
Travelling expenses (transportation of miners, etc.)		6,039 87
Mine office expenses		1,307 00
Bullion expenses (royalty, insurance, transportation, etc.)		1,633 24
Management		5,228 18
Stable expenses		628 85
Tools and implements—loss for season		288 70
Horses account 〃 〃		190 00
Quicksilver account 〃 〃		242 69
Total operating expenses for season		$81,451 57

"RECEIPTS FOR SEASON 1903.

Gold product for season	$44,943 70
Profit on stores sold	2,123 19
Total receipts for season	$47,066 89

"SUMMARY OF MINING OPERATIONS FROM THE TIME OF COMPLETION OF WATER SUPPLY SYSTEM IN 1898.

Year.	Precipitation in inches.	Water used in Miner's inches.	Time Run.	Cubic Yards Gravel Washed.	Product.
1899	28·65/100	353,056	144 days, 8 hours	1,952,535	$ 92,678 93
1900	30·67/100	460,878	171 〃 13 〃	1,843,938	350,085 77
1901	20·30/100	258,250	104 〃 13 〃	2,420,288	142,273 41
1902	23·40/100	179,520	65 〃 15 〃	690,442	61,395 19
1903	17·48/100	127,083	53 〃 7 〃	373,000	44,943 70"

Under date of November 30th, 1903, Mr. W. Stephenson, Mining Recorder at Quesnel Forks, reports as follows:—

"For the third consecutive year, water for hydraulic mining purposes has been very short, the present season of 1903 being especially bad, owing to the light snowfall last winter, the supply giving out very early. It is true that there was a great deal of rain in the latter part of the season, which enabled the small hydraulic claims on Keithley and Snowshoe creeks to resume work and continue it for nearly a month, but the larger companies did not recommence operations after once closing down. However, for the work done with the water obtainable, the returns have been quite as good as in previous years, and should the snowfall be heavy during the present winter the output during the coming season should be good.

"On Keithley creek, after several years' prospecting by both shafts and tunnels, and at considerable expense, Messrs. Veith & Borland have succeeded in finding and driving a tunnel into a hill channel, striking good pay. This promises to be a permanent and paying claim.

"On the South Fork of Quesnel river some gold was obtained by closing the Golden River Quesnel Company's dam and working the bed of the stream for a short period. As near as can be ascertained, however, little was made over working expenses. Little other work has been done in this vicinity.

"With regard to mineral claims, a company of Spokane men did a limited amount of prospecting and made several locations on Snowshoe mountain, on which some preliminary work was performed. It is their intention to thoroughly test their claims in the spring. Very little other prospecting for or development of mineral claims has been done."

OMINECA DISTRICT.

OMINECA MINING DIVISION.

REPORT BY FRED. W. VALLEAU, GOLD COMMISSIONER.

I have the honour to submit my sixth annual report upon the mining industry of the Omineca District.

The weather this past year has again been extremely wet and cold, heavy snow-storms occurring during the months of July, August and September. The creeks, in consequence of so much rain, have been abnormally high all the season and the trails throughout the district have suffered considerably, the traffic being heavy and the continual rain keeping them soft and wet.

This past season the Omineca District has begun to experience that activity in prospecting (both quartz and placer) which is bound to spread over the whole of this section now that the building of the Grand Trunk Pacific Railroad to the Pacific Coast is assured, as whatever Pass is chosen through the Rockies, the road will run through the district from east to west, opening up to the prospector and capitalist hundreds of square miles of new country which up to the present time has been forced to lie idle and unexplored, owing to its isolation and the prohibitive cost of getting in provisions and supplies. Once the difficulties and cost of transport are removed by the completion of this transcontinental road, large tracts of ground that to-day are known to contain gold, but which under the existing conditions cannot be worked at a profit, will be taken up and developed and will add to the prosperity of the district.

Until this season (1903) there had been little or no prospecting for quartz in the district, except in the vicinity of Mount Selwyn, on the Peace river, where a few claims have been located on what is supposed to be free-milling quartz. This season, however, there have been quite a number of men from the Kootenay in the district prospecting for quartz, and all speak in the highest terms of the country within a radius of 30 miles of Manson as being rich in silver, lead and gold. Several claims have been located by these parties on Boulder, Lost and Manson creeks. One average sample from Boulder creek, taken by myself, and on which an assay was made at the Government Assay Office in Victoria, gave 115 ounces of silver and 68 per cent. lead to the ton. Some free-milling gold quartz claims have also been taken up and samples therefrom brought out for assay, but up to the time of writing I have not heard what the returns were.

Coal has been located on the Parsnip river, in the vicinity of the mouth of the Nation. The seams are reported to be large and to be exposed on the surface over a large area; the quality, too, is said to be excellent, and I expect samples both for the Mineral Museum and for assay. Coal is also known to exist between Manson creek and the Omineca river, but, so far, no prospecting for it has been done in that direction.

The trail from Manson to the confluence of the Findlay and Parsnip rivers (the source of the Peace river), located and opened by me this season, under instructions from the Hon. the Chief Commissioner of Lands and Works, passes through an entirely new section of the district. Following, as it does, the valley of Manson creek it crosses and opens up several streams which will probably repay well for being prospected, what little panning was done giving good results, although, of course, bedrock was not reached in any instance, the gravel only being tested. This trail is now cut out to within about 9 miles from the head of the Peace river, and will enable parties to go into the Peace and Findlay portion of the district, which has been hitherto practically closed to the prospector owing to the great difficulty of access.

Several men are wintering in the district, developing their properties. Following will be found described in detail what has been done this season:—

43RD MINING AND MILLING COMPANY OF CARIBOO, LIMITED LIABILITY.

This company, which was the first to start hydraulic mining upon a large scale in the Omineca District, having acquired its property in 1895, has not operated for the past two seasons, having been in financial difficulties during that time. Upwards of $240,000 has been expended in plant and development work and has proved that the company's Slate creek property is exceedingly rich.

MAY FLOWER MINING COMPANY OF TOM CREEK.

Active operations have been carried on upon this property all the season, and very satisfactory returns were received. This ground is deep and has been difficult to open up, but the owners, after years of hard work, are now commencing to receive well-earned returns from their labour. The *May Flower* has paid all costs of working this season and has given a fair surplus. The bedrock has again risen some feet and the prospects for next season's work are better than at any time since the claim was opened.

The St. Anthony Exploration Company has retired from the district. The president, in writing me upon the subject, says that it is not that the directors have lost faith in the Omineca District or in the ground originally held by them, but simply on account of financial reasons.

THE OMINECA AND PEACE RIVER MINING COMPANY.

This company, formally known as the Arctic Slope Hydraulic Mining Company, has again been operating in a small way on one of its claims situate at the mouth of Black Jack gulch, on Manson creek. Ten men were employed until July 6th, when the mine was closed down. The manager's statement showed a return of $2,756. This company is holding 25 leases in the district, but is only conducting operations upon the one claim mentioned above.

The *Breadwinners Group*, consists of 6 leaseholds, situate on Manson at the mouth of Lost creek, and is owned by Mr. E G. Tilton. A layover was granted upon these claims again this season and nothing was done upon them.

The *Newitt* claim consists of a hill claim on the east bank of Lost creek at the canyon, and is owned by Messrs. Newitt & Mullin. These gentlemen carried on development work steadily all last winter and have now their tunnel in 360 feet, having driven 233 feet this past year, besides two air shafts to the surface. They hope to strike the old channel of Lost creek this winter, as they are again wintering in the district to continue development work.

THE ROSENTHAL CLAIM, LOST CREEK.

This is also a hill claim on the east bank of Lost creek, situate about 1,500 feet up stream from the canyon, and was worked last winter by Mr. Rosenthal, who ran a tunnel into the hill for 125 feet. This winter he is opening up another tunnel lower down the creek and expects, from the information gained from the tunnel run last winter, to strike the old channel within 100 feet. A good house is now built, provisions for the year laid in, and blacksmith's shop, etc., erected on the claim.

THE McKINNON MINE, LOST CREEK.

This season Mr. McKinnon has, by means of a ditch, kept the creek turned on to the hill, and has been ground-sluicing the top dirt off so as to be able to get at the pay gravel. Some little mining was done on this claim during the fall, paying $4 per day to the man.

THE EUREKA MINE, BLACK JACK GULCH.

This property was prospected last winter by Mr. Munroe and partner, by running a tunnel into the hill in order to tap the old channel of Black Jack gulch. One hundred and twenty-five feet of tunnel was dug and some 30 feet of an incline run, when it was found that they were too high; this winter another tunnel will be run on a lower level, when they hope to reach bedrock on the old channel. Good prospects were had from the bottom of the incline, and fine looking pay gravel exposed.

TOM CREEK.

Besides the May Flower Company, two Chinamen worked a claim upon this creek this season, but did not take out anything more than wages.

VITAL CREEK.

Two companies have locations on this creek, viz., the Vital Creek Mining Syndicate and the Caledonia Gold and Silver Mining Company. Both companies were granted lay-overs again this season, so that nothing has been done by either.

Some Chinamen also mined here this season, but none of them made more than small wages, owing to the upper portion of the creek ground-sluicing out and a "jam" being formed at the upper canyon, the breaking of which caused a tremendous flood, which washed down the creek and swept everything before it. When I was at Vital creek in August I saw where the creek bed has been cut down by water fully 30 feet deeper than when I saw it last.

MANSON CREEK.

Mr. Evans, with two men, was employed this season in digging some hundreds of feet of ditch in order to get drainage on the upper portion of his claims, but he could not reach bedrock.

OFFICE STATISTICS—OMINECA DISTRICT.

Leases in force	82
Leases issued	1
Placer claims recorded	26
Mineral claims recorded	8
Payments in lieu of work	8
Conveyances or other documents of title	2
Free miners' certificates	68

Revenue.

Free miners certificates	$ 314 50
Mining receipts, general	1,685 05
Mineral tax	209 46
Miscellaneous	439 90
	$ 2,648 91

MARYSVILLE SMELTER, FORT STEELE MINING DIVISION–FURNACE SHED.

MARYSVILLE SMELTER, FORT STEELE MINING DIVISION–CALCINER SHEDS.

SOUTH-EAST KOOTENAY DISTRICT.

FORT STEELE MINING DIVISION.

Report of Provincial Mineralogist.

Fort Steele Division has in past years made very large outputs of silver lead ores, but these ores have always been low in silver, running from ⅓ to ½ ounce of the latter to the per cent. of lead.

Owing to the continued depression of the lead market, combined with the low price offered for silver, the production from this district has been almost entirely stopped, only two properties in the division having made any shipments, *i.e.*, the *North Star* and *Sullivan* mines, and these shipments are merely nominal. The *North Star* shipped a little over 600 tons of ore, chiefly from development and "clearing up" work, while the *Sullivan* has done no mining but shipped some 330 tons of low grade ore from a second class dump, running about 15 ozs. silver and 30 % lead.

North Star.

The *North Star* mine was visited on July 14th, when it was found that shipments had been suspended, but that a force of about 20 men was employed, chiefly on prospecting and development work. The large and exceptionally clean body of galena with its accompanying carbonates, from which the big shipments heretofore maintained from this mine have been made, has been mostly worked out, and the course of such working out has not led up to the discovery of any further bodies of important size. This original body has already produced over 40,000 tons of ore, which has been shipped, and there is undoubtedly some further ore remaining; but this is a small proportion of the original body and its bounds have been pretty thoroughly defined and limited. The original ore body might be described now, in the light of development, as a large basin filled with galena, lying almost flat and practically on the surface, being covered only by surface deposits.

The previous managements of the mine, in their endeavours to locate further ore bodies, have acted on the belief that such would be found near the surface and as extensions, so to speak, of the first body. Prospecting, consequently, took the form of shafts, diamond drill and bore holes put down at various points surrounding the main workings. Of these a large number have been sunk, but without discovering workable ore. The present manager, Mr. J. L. Parker, is proceeding on the belief that if further ore is to be developed it will be at a greater depth, and, although he has not entirely abandoned shallow testing holes, he is confining his efforts chiefly to sinking an inclined shaft, following down a distinct fissure in which there is a small stringer of quartz and iron sulphides with a little galena. This shaft was down 220 feet at the time the property was visited, and at 60 feet depth was connected by drifts with the old workings. Below this, at 100 feet from the surface, a drift had been made to the north for 96 feet, with a cross-cut of 50 feet. At 150 feet down a drift was off to the south for 50 feet, with a cross-cut of 25 feet, while at 200 feet down a drift was again off to the south for about 100 feet. Below this the shaft was being continued and was then down 20 feet further. Much encouragement had been received at times, from the general appearance of the fissure, in the belief that ore would be encountered, but when the property was seen by the writer no ore body had been met with in these workings.

The property has been previously described in these Reports, as has its equipment. The mine is connected by aerial tramway with a branch line of railway from Cranbrook, by which route the ore is shipped. The mine is fully equipped, has excellent cook and bunk-houses, store and office buildings, as well as comfortable houses for the manager and for the accountant.

Sullivan Group.

The *Sullivan Group* includes the *Hamlet*, *Shylock* and *Hope*, Crown-granted mineral claims, situated on Sullivan Hill, on Mark creek, and about two miles from the town of Kimberly. The property is held by the Sullivan Group Mining Company, of Spokane; President, Senator George Turner; Vice-President, Bernard Layton; Secretary, J. C. Williams, Spokane, with James Findlay in charge at the mine. The company, in addition to the mine, owns the partly constructed lead smelter at Marysville, for the building of which bonds were issued and secured by a mortgage on the mine.

The mine has been previously described in these Reports, since when considerable work has been done in the way of development, but as the ore is so exceedingly low in silver and the price of lead has also been low, very small shipments have been made, amounting to 3,000 tons in 1901, nothing in 1902, and about 330 tons from the dump in 1903.

The ore is a galena carrying an unusual amount of iron, the first-class ore assaying about 40 % lead and 20 oz. silver, and the second class about 25 % lead and 12 oz. silver, varying somewhat as it may have been sorted. The development work done has been rather irregular in character, consisting in small tunnels and drifts run into what appeared to be a great basin of ore, lying near the surface, the evident intent being rather exploratory than with a view to future working. These workings are so irregular as to defy any written description, so none will be attempted, but with all their irregularity and apparent lack of systematic planning, they have managed to develop a very large amount of ore which may fairly be classed as "in sight,' and which from rough calculations may be put down as from 300,000 to 400,000 tons, assaying, approximately, 30 to 35 % lead, and 15 to 18 oz. silver. The ore is of such a character, being chiefly metallic sulphides, as to preclude any method of water concentration, the only concentration possible being by smelting.

The development as it continued to the dip, down the hill, would seem to indicate the probability of a number of step faults in that direction. These faulted the ore body, giving to it the effect of a dip of about 60° to 70°. A shaft (No. 5) has recently been sunk to the dip, and has struck the ore body at a depth from the surface of 106 feet, giving about 150 feet below the upper portion of the ore body. From this point some very fine samples of galena have been taken, giving in the Government Assay Office: lead, 50 %, silver, 10 oz. per ton. This galena is of different character from that in the upper workings, being much freer from iron, and leading to the hope that underlying the very low grade surface ores a zone of richer and purer galena may be encountered. The ore is exceedingly hard, but the hanging wall is so sound and firm as to require little timbering, and mining should be done at low cost. The work done is most encouraging in the amount of ore developed, and, with the apparently higher assays obtained at the depth reached, the deposit should be further and fully tested. At present ore has to be hauled from the mine to Kimberley, a distance of two miles, over a waggon road, from which it is shipped by the branch line of the C. P. Railway. An aerial tramline has been planned, but not as yet constructed; this, with a length of about three-quarters of a mile, would convey ore to an extension of the railway.

The property is equipped with a good air compressor and boiler, small hoists, &c., and there are also bunk and cook houses, office and laboratory buildings, and two or three small houses for the foreman and staff.

Marysville. The little town of Marysville is situated on Mark creek, where it crosses the flat plateau or bench of the valley of the St. Mary's river, some five or six miles from the town of Kimberley, near which the *North Star* and *Sullivan* mines are located. A spur of the Cranbrook & Kimberly branch railway runs into the town, and recently a large saw-mill has been built, giving work to a number of men.

Smelter. Marysville is the site chosen by the Sullivan Mining Co., for the erection of a lead smelting plant for the treatment of ore from its mine, and probably in the expectation also of getting ores from the other mines in the locality. The depressed condition of the lead market and other causes have prevented the completion of the plant, which stands to-day in a half-finished condition, exposed to the weather and rapidly deteriorating, a fact much to be regretted, as a slight expenditure would protect the plant and machinery in place until such time as the work is completed. The smelter bears evidence of having been constructed on designs of different people, and is, consequently, not entirely consistent. To be completed and rendered economical to work, it would require to be largely remodelled, but this could be done at no great expense, as much of the material and plant are very good and suitable for the purpose intended.

Smelter Site. The site chosen for the smelter is a large flat or bench, from which the ground drops off on two sides to the river valley some 150 feet lower. The subsoil is gravel, giving an excellent opportunity for cheap but good foundations. The general scheme of the smelter, as apparently intended from the construction partly completed, is as follows:—The ore was to come in on railway cars, over a trestle about 4 to 5 feet high, the level of the car floor being that of the receiving floor of the sampling plant. From the sampling plant the ore was to be delivered by buggies to a series of bins slightly elevated, and from these bins it was to be wheeled on the ground level to the calciners standing on the same level, into which it was to be shovelled, presumably, as no provision for top charging was noted. The calciners were only equipped for drawing the ore into buggies, and it was afterwards to be sent to the charging floor of the furnace shed by wire rope aerial tramway, the charge being dumped and mixed on this floor. The fuel and fluxes were to be dumped from railway cars standing on a trestle 8 to 10 feet high into bins on the ground level, and thence taken to the furnace shed by aerial tramline. The plant, as far as completed, was erected under the supervision of Mr. L. S. Austin.

Office Buildings. The general office, the only structure completed, is a two-story wooden building, clapboarded and with shingle roof and containing, down stairs, a general office, private office, draughting room, etc., while up stairs are quarters for the superintendent and staff.

Assay Office. The assay office is a one-story wooden building, clapboarded and with shingle roof, and is divided into a furnace room, in which there is a brick, muffle furnace for two 10-inch muffles, fired with coal from the next room, and the sampling room, off which there is a coal bin. From the furnace room a door opens into the "wet" or analytical room, and from each of these a door opens into a small but compact balance room. Off the furnace room there is a supply room for assay supplies. The whole is a small but exceedingly convenient assay office, well designed and well built.

Sampling Plant. The sampling building is about 30 by 40 by 40 feet high, and is situated on the railway siding as it enters the smelter grounds. At present little of the sampling machinery is in place other than two elevators, each running the height of the building. The plant is arranged for a very complete system of automatic sampling, and it was reported that all machinery was on the ground for its equipment.

Main Furnace Building.

The main furnace building is 96 feet long by 32 feet wide, with a lean-to along one side in front of the furnaces. The construction is entirely of sawn lumber and is so very light that supplemental trusses and posts were afterwards put in to support the charging floor. The charging floor is 25 feet above ground and the eaves about 14 feet above this. The roof has a very flat pitch, and is covered with tar and gravel roofing. In this are already built two lead blast-furnaces 7 feet by 14 feet outside dimension, and 138 by 40 inches inside of jackets at the bosh. The bottoms of the furnaces are of standard type, cast-iron plates, with suitable attachments, lined with "Carr" Scotch firebrick. Above this are the sectional jackets, of cast-iron, 21 inches wide, and each having a 4-inch tuyere hole. They are provided with the usual and suitable water attachments. The upper part of the furnace is brick-work resting on iron girders supported by iron columns and independent of the lower construction. The charging openings are the length of the furnace on one side; they are level with the charging floor, and provided with counter balanced doors of wrought-iron. The stacks are vertical continuations of the furnaces and are of brick, iron bound, to above the roof, which is as far as they are built. No provision has been made for dust chambers. The furnaces are modern, well built and are provided with full equipment of settling pots, slag pots, moulds, etc., all made by the Union Iron Works, of Spokane. Whatever criticism the general arrangement may be open to, the furnaces, as such, are good and suitable to fit into any readjustment. In a small shed are two Connersville pressure blowers, in readiness to be put in place, also all necessary blast-pipe, etc.

Calciners and Shed.

The calciner building is of rather unique and original design (as shown in engraving) having a wooden frame covered with corrugated iron roof, and of such a form as to make a series of inclined steps, 13 in number and covering 6 calciners. The calciners are of the ordinary single hearth hand-worked type, 46 feet long and 16 feet wide, having 9 rabbling doors on each side and a double-doored fire box. These furnaces are built of red brick, with a second quality fire brick inside; they have a brick hearth laid on earth filled in between the walls, and are bound with iron rail buck-stays and 1 inch tie-rods. The furnaces were built when there was frost in the ground and also in the filling under the hearths, which has caused such settling as would necessitate the arches and hearths being all rebuilt.

Power.

Water sufficient to supply power for all requirements of the smelter is obtained from Mark creek, from which it is conducted in a flume 4 feet by 4 feet 6 inches in size and 700 yards long. The flume conducts the water into the smelter bench, from which it is led to a power-house in the river bottom by iron pipes, giving a head of about 175 feet. The power-house is to be fitted with water wheels, from which power is to be transmitted to the smelter by 3 rope drives, but all of this work is as yet uncompleted.

Water Supply.

A water supply for use about the smelter is provided from Mark creek, the water being conveyed from about half a mile up the creek by an 8-inch pipe-line.

PERRY CREEK.

Reports of renewed activity in placer mining and the installation of a couple of large plants on Perry creek led the Provincial Mineralogist to visit the scene of these operations on July 11th, 12th and 13th, 1903. In the early 60's Perry Creek attracted a good deal of attention as a placer mining camp, and unquestionably a considerable amount of placer gold was obtained there, exactly how much there are no records to prove, but the evidence of work done and the importance of the old camp of "Old Town," as indicated by the few remnants that now exist, all go to show that it was the centre of rather extensive mining operations. In the early days the gold was principally obtained below the "Falls" on Perry creek, and near the bottom of the canyon. Attempts to follow up the gold have, in later days, been numerous, and some have been successful to a certain extent.

PERRY CREEK HYDRAULIC MINING COMPANY.

The "Falls" occur in a canyon which cuts through a bluff of rock, the old channel of the stream apparently having passed on one side of this, and certainly on the right bank of the creek there is an old gravel channel on which, at the level of the creek, below the Falls, a tunnel (the old Montezuma tunnel) was driven in for from 1,000 to 2,000 feet, with certain workings in connection therewith of which no plan is known to exist. Whatever the course of this old channel may have been, it apparently emptied into the present creek below the Falls, as the old drifting proposition mentioned proved, and this work also proved that there is a paystreak which, according to "old time miners," was not down to bed or even rimrock, as bedrock was never reached by the tunnel. While there is unquestionably gold in such old channel, the paystreak was either not sufficiently defined or not rich enough to pay as a drifting proposition after it reached such considerable distance from the surface. That the gold in this old channel is not confined to bedrock, was demonstrated by the old tunnel workings in the first place, while later prospecting work has revealed two or three paystreaks in the overlying bank, not rich enough for drifting but sufficiently so to induce a company to attempt to hydraulic the whole bank. This company is the Perry Creek Hydraulic Mining Co., a syndicate formed of United States capital, and of which A S. Trow, H. A. Bright, E. G. Brayton, and D. Halliway, of Merrillan, Wis., are the largest holders. Mr. Wm. Trow is local manager or agent, and Robert Jennings, superintendent in charge of the work. The company has secured water rights on Perry creek, taking water from the stream about four miles above the Falls, and having under construction a wooden flume, 4 feet wide by 3 feet high, built of 1¼ inch lumber. To cut this lumber the company had erected a saw-mill at Saw-mill creek, and had let a contract for 300 M. feet of logs at $4 per M.

The clearing of the surveyed flume line was well under way at the time the property was visited, as was also the flume construction, with every probability of being completed during 1903. The flume leads along the right or south side-hill, attaining a height above the creek of about 300 feet. At the lower end of the flume a "siphon" of rivetted iron pipe was to be constructed over a draw, narrow but having a depth of 175 feet. The siphon was to deliver its water to a short ditch, leading to a pressure box situated on the top of the hill, from which a pipe-line was to run down the face of the bank to the mouth of the Montezuma tunnel, where it should deliver water under a head of about 400 feet. The stream, from the tunnel down, is confined by steep banks and has a fall of about 3 per cent; this is not enough to carry off hydraulic tailings, and, consequently, they will have to be sluiced away in boxes for about half a mile below the Falls. This will necessitate the bottom of the hydraulic pit being some 50 or 60 feet above the creek at the mouth of the Montezuma tunnel. Consequently, while the upper part of the bank can be run off by straight sluicing methods, the lower 60 feet will have to be raised by an elevator of some sort.

The bank representing the face of this old channel has been cleared of timber to its summit. This bank is about 400 feet high and is composed of fine gravel, silt and some clay, which will wash cheaply and quickly, but will have to be handled very carefully as it has a tendency to "slide," a thing which, if it occurs, will choke the canyon and interrupt operations for some time. Hydraulicing operations should begin in the spring of 1904 and with judicious handling the property has a good chance of becoming a producing mine this next season.

Above the Falls the old channel is deep and several attempts have been made to test and work it by means of shafts sunk in the early 90's, but, while gold has been found, these operations have not been commercial successes. In the stream bed there is a clay or "false" bedrock, on which gold in paying quantities has been obtained at several points.

THE EAST KOOTENAY PLACER MINING COMPANY.

The East Kootenay Placer Mining Co., a local company, in which Dr. Bonnell, W. Ross and J. McDonnell, of Fernie, and others, are interested, has secured leases about 4½ miles above the Falls, and has established a steam shovel for lifting the gravel into the sluice boxes. At the point selected for operations the creek bed has a grade of about 2 to 3 per cent, and at a depth varying from 3 to 10 feet there occurs a "false bedrock," consisting of a sandy clay, on and above which gold in considerable quantities has been found. The true bedrock is believed to be at a depth of approximately 50 feet lower, since at this depth it was struck in both the old Ridgeway and Baker shafts, a short distance away. From the former of these shafts drifts were made, so it is reported, down stream for 150 feet and up for 25 feet. In the shaft $90 was said to have been found, and the drifts were stated to have paid $7 per day to the man for a time. The Baker shaft was also drifted from for some 100 feet, but was not profitable.

The original intention at the installation of the plant was to work the gravel on and above the false bedrock, and of this a patch 64 yards long, 8 yards wide and 2 yards deep, equal to about 1,000 cubic yards, has been taken and dumped into the rough sluice-boxes. From this small patch gold amounting to $260, as reported by the management, was obtained, being equivalent to 26 cents per cubic yard.

The shovel is a regular railway steam shovel (built by the Vulcan Iron Works, of Toledo Ohio), mounted on a standard gauge car running on rails; it is self-propelling and has a bucket of 1½ cubic yards capacity. The motive power is supplied by steam from a vertical boiler forming a part of the equipment. The shovel, which weighs about 45 tons, was brought up from the railway as it stands and under its own steam, over the waggon road, on moveable sections of track, an exceedingly difficult undertaking considering the road travelled over. The shovel has a rigid bucket arm long enough to load railway cars from a gravel pit, a lift of say 10 to 12 feet, and at first worked very well, but as the cuts worked up stream the bedrock ran very flat, and the height therefrom to the sluice-boxes increased, so that eventually the dipper arm was found to be too short. Operations were accordingly stopped and the superintendent, Mr. Banks, was then sent East to have a longer arm prepared to enable the shovel to take a wider cut and to lift higher.

Some difficulty has also been found in disposing of the tailings, as the stream had not sufficient grade to carry them off, and it was, therefore, found to be necessary to "stack" them, an appliance for which was also being arranged for by Mr. Banks. These additions to the plant will not be ready until the season of 1904.

If the ground worked may be taken as a sample of the values to be found above the false bedrock, and there is no reason why it should not be, there is on the leases a large tonnage of material which, with the plant modified as proposed to suit the conditions, can be handled to a good profit. The plant, as it stands at present, is realised to have too small a range to be effective, and operations had been suspended until the requisite alterations were made. In the meantime the bucket arm had been unshipped and the winding engine of the shovel was employed to hoist the dirt from a shaft, which was being sunk to the bedrock proper to test it at this point. It is expected that, as work proceeds up stream, true bedrock will rise nearer the surface, and that towards the upper part of the leases it may be possible to reach it from the level.

Water for sluices is taken out of the creek about half a mile above the shovel, and is brought down in a board sluice-box 32 inches wide and 15 inches deep.

These were the only two placer mining enterprises in actual operation on the creek in August last. Some little placer prospecting was being done with a view to locating ground suitable for shovels, dredges, or other mechanical arrangements; this work, as yet, has not developed into mining propositions. About half a mile below the Falls, on the right bank of the stream, a partnership of the old-time placer miners has sunk a shaft and is drifting for bedrock. This work is only carried on in the winter when water is not so troublesome. The results obtained are said to be satisfactory, yielding good wages to those employed.

Of the mineral claims located on Perry creek there is little to be said that is new; a general description of these will be found in the report for 1898, and, with the exception of a certain amount of additional development work, nothing of importance has transpired. A large number of the claims then mentioned have been allowed to lapse, though some new ones have been located. Sherwood's claims, there noted, are still held by him in good standing, and he has done considerable development work on them, proving the continuity of the ledges, with what results as to values has not been learned. It is understood, however, that the claims had this past summer been bonded to Eastern parties, after an examination by their representative.

Jay Usher and Billy Kid are reported to have located some claims some distance up the Creek, and on these there are said to be good surface showings, although nothing further has been proved as yet.

Messrs. Ross & Thompson, acting for American capital, have located some property about 12 miles above the "steam shovel." The showing is described as being in an almost inaccessible position on a steep bluff, the lead dipping at a steep angle into the hill, and from here some very good specimens showing copper sulphides were obtained. Operations are now under way to drive a tunnel into the hill, at the bottom of the bluff, to try and tap the lead at depth, but as yet have not gone far enough to give any results. Some four or five men are employed in driving this tunnel.

The waggon road up Perry creek from Cranbrook and Fort Steele has been extended up to the "steam shovel," and thus far is in very good condition. Should occasion require it, this road could be extended for four to six miles further up the flat valley at a small cost, as there is practically no timber, it having been burned off, and the grade is easy and uniform.

Summary Report on the Valley of the Flathead River.

General Geographic Features.

That area of land occupying the most south-east corner of the Province of British Columbia, and known on the official maps as Block 4,593, consists of a triangular piece of country, having as a base and boundary on the south the 49th parallel; on the north and east, the eastern boundary of the Province, *i. e.*, the summit of the watershed of the Rocky Mountain Range; while on the west it is bounded by Lot No. 4,589, the eastern boundary of which is described as a line starting at 0 on the B. C. Southern Railway in Crow's Nest Pass, viz.: the Provincial boundary in this Pass, and thence running due south to the International Boundary.

The first of these boundaries, the International Boundary, is distinctly marked on the ground, the line having been run out this past summer by the joint Canadian and United States Commission, the right of way cleared through the timber for a width of 100 feet, with stone cairns at important and convenient points, while arrangements have been made for the bringing in this winter over the snow and the placing in position of bronze monuments where the line crosses summits or important streams.

The boundary between British Columbia and Alberta is a sharply defined mountain range, on which the dividing line may be very approximately placed with little or no dispute, quite close enough for all practical purposes, as that particular section is destitute of timber or good land, and as far as can be judged from its geological formation, is unlikely to be of mineral value.

The western boundary has not been run out on the ground, and as there are no maps of the district based on surveys, but only sketch maps made from the descriptions given by prospectors and others, it is impossible for one examining the district to more than very approximately estimate the position on the ground of this theoretic line. This western boundary line, after leaving the initial point as described, passes into Alberta, only striking the eastern boundary of the Province of British Columbia at a point some 6 miles to the south of the Crow's Nest Pass, so that this point thus becomes the real point of commencement of the western boundary of the block in question.

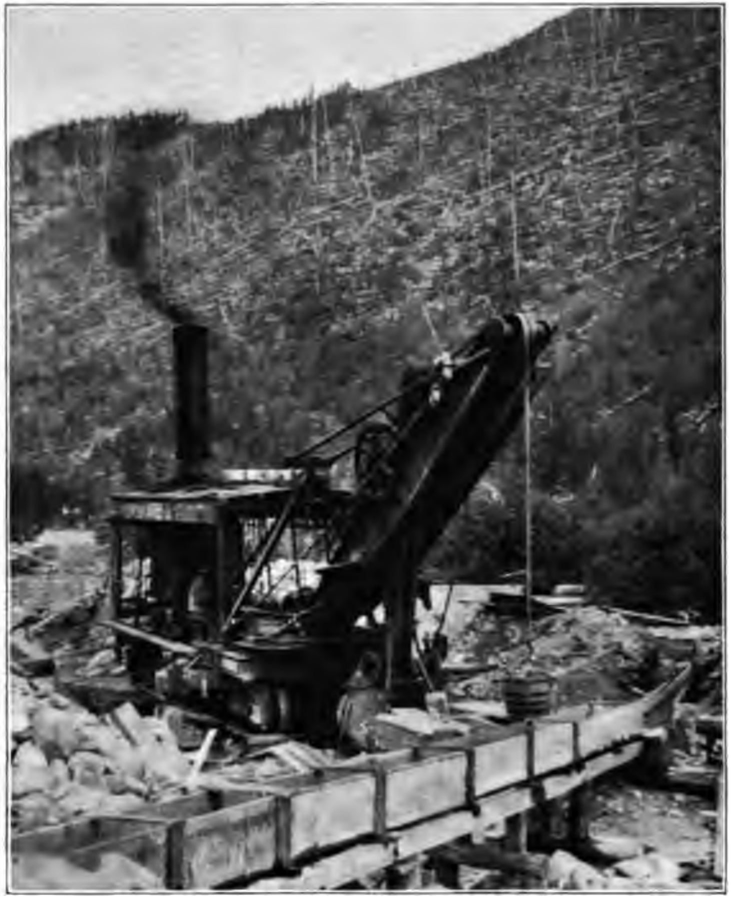
The block in question may be practically described as that portion of the drainage area of the North Fork of the Flathead river lying in British Columbia, to which may be added certain parts of the headwaters of the East Fork of Lodgepole creek, although exactly what portion of this latter cannot be determined without an actual survey. In shape the district is an inverted V, having a width along the base, *i. e.*, east and west along the International Boundary, of approximately 35 miles, and a height, viz., north and south, of 35 miles.

The Flathead river flows from the northern corner of the district in a general S. E. by S. direction, almost along the centre line of the block, and crosses the International Boundary at about 114° 28′ west longitude, into the State of Montana. The watershed to the east and north is the main range of the Rocky Mountains, while that to the west is a spur from the main range which branches off, in a nearly south direction, at the head of Flathead, and is known as the Galton range, forming the divide between the Flathead and Wigwam rivers. The upper and northern portion of the drainage area of the Flathead has very little width from east to west, the mountains approaching close to the river and the channels of the tributary streams rising rapidly from the river bed.

Above Pass creek the river valley is from ½ mile to 2 miles in width, and is chiefly marsh or slough land, occasionally, towards the south, alternating with dry prairie. The elevation of the river bottom is here about 4,600 feet (barometric reading). The valley gradually narrows in as the canyon is approached (some 30 miles north of the boundary), and the limestone mountains almost hang over the channel of the river, forcing the trail to climb high up the side-hill. The elevation of the river just below the canyon is about 4,460 feet, and at the Boundary the elevation is 4,000 feet. (The United States geological survey bench mark is 3,986.) Between these points, a distance of about 30 miles, it is a gradual descent.

A few miles below the canyon the mountains to the east retire and the valley widens out, having evidently been an ancient lake bed which extended to the east and included the present channels of both Sage and Kish-e-neh-na creeks, the various gravel benches representing the different levels of the bottom of the ancient lake. The mountains to the east and north of the river are very rugged, with steep escarpments rising abruptly from low foot-hills. The average height of this range is from 7,000 to 9,000 feet above sea level, while the peaks rise to an elevation of about 12,000 feet. To the west of the river the mountains rise very much more gradually and are preceded by foothills, timbered to the summits with small black pine and spruce.

PERRY CREEK HYDRAULIC MINE—FORT STEELE M. D.



EAST KOOTENAY PLACER MINING CO.'S STEAM SHOVEL, PERRY CREEK.

The Flathead river at the Boundary has a width of from 100 to 125 feet, and a depth in spring of from 6 to 8 feet, while in the late summer the average depth at such points will not exceed 2 feet, with an estimated stream velocity of from 4 to 5 miles per hour. The volume of water at the canyon in summer is estimated as about half that at the Boundary.

Kish-e-neh-na creek rises at the Alberta summit, about 4 miles north of the Boundary, and flows a little north of east for 12 miles, thence southerly for 8 miles, where it enters the Flathead river from the N.E., about 4 miles south of the boundary.

Sage creek flows nearly parallel to Kish-e-neh-na, but about 3 miles further north, entering the Flathead about 2 miles south of Boundary. The last 10 miles of its course is through the wide Flathead depression, free from the mountains.

About 14 miles up the Flathead river from the Boundary there is an important creek entering from the east, evidently having its source at or near the summit of the Rockies.

Pass creek comes in from the N.E. at the Big Prairie. The river here takes an almost right angle bend, flowing from the west, and above the bend there are two important creeks flowing in from the north, which, as far as known, are still un-named. The first of these has a length of 12 to 15 miles, and it is reported to have its source near that of the South Fork of Michel creek, while it is said there is a low pass between the two creeks which might prove of value as a route of access for a railway.

Of the creeks flowing in from the west, Calder creek has its headwaters within a few miles of the Wigwam, about 6 miles north of the Boundary, and flows in a general easterly direction, entering the Flathead 3 miles north of the Boundary.

There is only one other creek of any importance flowing in from the west below the canyon, and this enters the Flathead about 10 miles north of the Boundary. This creek was not examined, as no trail could be found leading up it, and as it enters the river by a series of marshes and swamps, its course could not be easily followed with horses.

Routes of Access.

As already described, the valley of the Flathead, while opening out to the south, is surrounded on all other sides by mountain ranges. To the south of the International Boundary, in Montana, the valley gradually widens in a series of gravel benches rising above the river. Along these benches a fairly good waggon road has been constructed from the town of Belton, Montana, on the line of the Great Northern Railway, right up to the boundary. The distance is reported as being about 40 miles. Access to the district from British Columbia, or from Alberta, may only be had by trails passing over the mountain ranges mentioned. There are two well-known trails crossing through the valley of the Flathead, both connecting the valley of the Kootenay river, in British Columbia, with the plains of Alberta, the one passing through the northern part and the other through the southern part of the district. These are known as the North Kootenay Pass and the South Kootenay Pass trails and were used, since time unknown, by the Indians of Kootenay as a pathway to and from the great plains, where they frequently went on buffalo hunting expeditions. On both of these trails the old and deeply worn ruts, plainly visible to-day, bear mute evidence of their former importance as highways.

The South Kootenay Pass trail followed the valley of the Kootenay for some five or six miles south of the Boundary, to the mouth of Tobacco river or Grave creek, as it is known locally; thence, following this stream up, it crossed over a summit at an elevation of 5,280 feet (being here some 15 miles south of the Boundary) on to the headwaters of Yakinikak creek, which latter it followed down to its junction with the Flathead, at a point some five miles south of the Boundary. The trail then followed the valley of the Flathead northward to the mouth of Kish-e-neh-na creek, up which it led, re-crossing the Boundary about four miles from the mouth of the latter stream and following it up to its headwaters. From these headwaters the trail crossed, at an elevation of 7,100 feet above the sea and 3,100 feet above the valley of the Flathead, over the summit of the Rockies to the headwaters of the South Fork of Kootanie river (this spelling is applied to a river in Alberta), and following this stream eastward for 15 miles, the open prairies of the foot-hills were reached near Watertown lake, Alberta.

This trail, in passing thus some miles to the south of the Boundary, circles south of the headwaters of the Wigwam (the southern tributary of the Lodgepole, having its headwaters some three or four miles south of the Boundary), and in so doing crosses only one summit between the Kootenay and Flathead.

The distances by this trail are approximately as follows :—

From Tobacco Plains to Grave Creek summit............	29 miles.
From Grave Creek summit to Flathead river............	13 "
From Flathead river to Kish-e-neh-na summit............	20 "
From Kish-e-neh-na summit to plains near Watertown lake.	15 "

The trail from Tobacco Plains to the Flathead is reported as being good, but was not travelled over by the writer.

From the Flathead up Kish-e-neh-na creek the trail was found to be good to within about five miles of the summit, where it became wet and muddy, but with a good bottom in all places. It was also here somewhat cumbered with fallen timber. This trail was used by both the first and second International Boundary surveys, and the district through which it passes has been described in the reports of these surveys.

The North Kootenay Pass trail left the valley of the Kootenay near the present town of Elko, crossed the Elk river on a pack bridge at the Elk River canyon, thence, following up the Lodgepole to the summit between that river and the Flathead, crossed over the divide at an elevation of 7,100 feet. It then followed the latter river down to Pass creek, a small stream coming in from the east, and followed this latter over a summit of 6,750 feet elevation to the headwaters of the south fork of Old Man river, which flows easterly into Alberta.

Snow remains deep on the North and South Kootenay passes from Alberta through the Rockies into British Columbia from November to July, but these trails have good hard bottoms, and as soon as the snow is gone are passable. The North Pass from the west along the Lodgepole is covered with snow at the summit for about the same length of time. The rise from the basin of the Lodgepole to the summit is very steep, and the trail bottom being clay renders it almost impassable in early summer until somewhat dried out, while from the summit to within five miles of Pass creek, on the Flathead, the trail is along a springy side-hill with a clay bottom, and can never be made a practical road, being a succession of bog-holes.

It has since been learned that a C. P. Railway prospecting survey cut a trail from Morrissey over a low divide to the basin of Lodgepole Creek, thence following up the East Fork of the Lodgepole across a low divide into the Flathead valley at a point a short distance above Pass creek, thus avoiding the bog-holes on the old trail. This trail is reported to be feasible, but rather soft in places.

The two trails first described are the time-honoured roads leading into and crossing the district. They were located originally by the Indians, and so are presumably the most available, though it must be claimed that, as viewed from a high peak, there appeared to be a much lower pass leading from an eastern tributary of the Wigwam, about half way between the two known passes, and which appeared to admit of a railroad grade being obtained from the Kootenay Valley into that of the Flathead.

The writer, wishing to reach the Flathead from Tobacco Plains, on the southern boundary of the Province, by an "all-Canadian route," followed up Phillipps creek, a small stream flowing into the Kootenay valley from the east at a point about two or three miles north of the Boundary. The trail leaves the main waggon road at Roosville, a small general store and post office situated where Phillipps creek flows out of the range of hills known as the Galton range, lying between the Kootenay and Wigwam rivers. The trail rises very steeply for about two miles, as the creek enters the Kootenay valley with a fall of 300 feet in about half a mile; thence, however, the grade to the summit is more gradual. The elevation of the Kootenay valley is about 2,300 feet, and that of the summit, at the head of Phillipps creek, 6,150, while the distance is about nine miles. From this summit a small unnamed tributary of the Wigwam was followed down to the main stream, a distance of ten miles, the Wigwam at this point having an elevation of 4,600 feet.

For this distance the trail was well cut out, having been recently used by a party of United States surveyors engaged in the demarcation of the Boundary Line. Both these creeks run nearly parallel to and about three miles to the north of the Boundary. From the Wigwam on there was no trail, but a blaze was followed which had been made last year by a prospector who had previously attempted to reach the Flathead by this course. It might be said that the prospector chose to return by another route.

Crossing the Wigwam about three miles north of the Boundary, a wide and heavily timbered valley was followed due east for about three miles, whence, following the blaze, the trail was taken by a series of zig-zags up a very steep and rocky range, running east and west, to the summit (elevation 7,100 feet), where good horse feed was found on the shore of a small snow-fed lake having no visible outlet. The distance from the crossing of the Wigwam to the summit is about eight miles, and is a good day's travel for a pack-train.

The northern side of this range was here found to be precipitous, limestone and slate bluffs, impossible to descend, and the summit was accordingly followed for about two miles to the east, to a point where descent to the basin on the north side was possible by going down a rock slide.

This basin (elevation 6,600 feet) drains into an important creek which flows nearly due east and is about five miles north of the Boundary at this point. The stream empties into the Flathead about three miles north of the Boundary and is the first tributary of the river from the west flowing in north of such line. This stream was unnamed and has been called Calder creek.

From the summit, at the head of Calder creek, to the Flathead is estimated at about 30 miles by trail, but represents three days' hard travelling by pack-train. The total distance by this route from Tobacco Plains to the Flathead river is about 50 miles, and is five days' journey by pack-train with light packs. The route, as at present laid out, is possible but not practicable as a permanent trail, although it is believed a much easier summit between the Wigwam and Flathead could be obtained about five miles further north, but at the cost of that extra distance.

The writer is informed that since he was over the ground the United States Survey party mentioned has continued the trail from the Wigwam to the Flathead, following closely the Boundary Line and crossing over two summits between these points.

Once the Flathead is reached good trails, or even waggon roads, could be built anywhere up the valley as far as the Canyon, and up the important creeks, at a comparatively small cost.

The present trails are Indian hunting trails, used only at low water; they lead in and out of the river, often following the river bars for miles. They would not be feasible in spring until high water is over, about the middle of July.

The trail to Sage creek leaves the main Flathead river trail about two miles north of the Boundary, running thence easterly for about three or four miles over the benches and low hills of the Flathead depression to a crossing of Sage creek, some six miles from its mouth. After crossing Sage creek the trail follows up the course of the east creek for about four miles, where it re-crosses and continues up the west side. The distance by this trail from the Flathead to the oil on Sage creek is about 11 miles. This trail has comparatively easy grades, is hard and in good order, but as the lower part of the Sage creek valley has been recently burned over, it is often obscure and hard to follow on the burned-over barrens.

A second trail has been recently blazed out, starting at a point on the main river trail some 10 or 11 miles from the Boundary and running due east to the "oil showing," a distance estimated at not exceeding five miles.

The Kish-e-neh-na creek trail has already been described as a part of the old "South Kootenay Pass" trail.

Timber.

The valley of the Flathead, including Sage or Oil creek, appears to have been all burned over about 30 years ago for a distance of possibly 10 to 12 miles from the Boundary, and timber is a second growth, consisting on the lower elevations of small spruce and fir, with some cottonwood and occasional tamarack (*larix occidentalus*), and on the benches of second growth black pine (*P. murrayana*). On the hills the timber consists of black pine, tamarack and spruce, and is small, not of a size to have any value for lumber. On Sage creek there is no good timber, as the second growth extends up point where the mountains close in, and much of the lower part of the creek district is composed of "barrens," devoid of any vegetation save small brush. On Kish-e-neh-na creek, for about 4 miles above the Boundary and for a width of about ¼ of a mile, the trees are occasionally of fair size, but there is not a great percentage of merchantable timber. In the valley of the Flathead the land is largely sloughs and islands, cut up by moving channels. On these low lands, from 14 miles above the Boundary northward for about 10 miles, there is a strip of timber having a width of from ¼ to 1 mile, say an average of about ½ mile wide, on which there is some very good, large timber, chiefly spruce and tamarack, with some large cottonwood. This timber could be floated down stream in the spring but at considerable initial cost, as there are a number of extensive log jams occurring in the river, besides many abrupt turns and bars. The trees on the upper reaches of the river are not suitable for lumber, but would serve for mine timbers should they be so required.

Soil.

The ancient wide valley of the Flathead, including the present valley and that of its chief tributaries for some 12 to 20 miles above the Boundary, has been previously described as consisting of a series of gravel benches. On this gravel, to a depth of from 6 inches to 12 inches, lies a fine silt and on the lower elevations a dark loam, largely produced from sediment deposited at unusually high water and mixed with a certain amount of vegetable mould. This supports, on many small and larger open prairies, a fine growth of pea-vine, bunch-grass, etc., providing everywhere excellent feed for transient horses, etc., but the soil has not a depth to admit of cultivation, lying, as it does, on a bed of loose gravel.

The Flathead is a wild stream at high water, and is constantly changing the position of its bed in the flat valley through which it runs, forming innumerable islands and back waters; in fact, so changeable is its course that no depth of soil seems to have collected on the sides of the valley.

Other than the valley mentioned the district to the west of the river is occupied by high rugged mountain ranges, for the most part bare or covered with stunted vegetation. The hills to the west of the river are more rounded off, and are often covered with small growth to the summits, but they rise so abruptly as to be useless for either grazing or agricultural purposes.

As already noted, the elevation of the river at the Boundary is 4,000 feet above sea level, so that, taking the character of the soil into account, none of the land in this section is deemed fit for agriculture, even at the southern end of the district.

There are three large creeks entering from the west, the valleys of these being about half a mile wide to where the hills rise steeply. These valleys contain considerable bog or marsh land, but lie at an elevation of nearly 4,400 feet.

Mineral Resources.

The district is so shut off from the remainder of the Province that very little prospecting has been done there for mineral, other than coal or oil, particularly by British Columbia prospectors, although a number from Montana have visited the vicinity. As far as could be learned from prospectors and others, no mineral locations have been recorded in the district, nor has any mineral of economic value been found. It was reported that copper had been found on one of the tributaries of the Flathead flowing in from the east, but nothing has been done to prove this alleged discovery, nor could the report be substantiated.

On the Flathead, near the mouth of the first creek above Pass creek (still unnamed) there is evidence that in the 60's or 70's considerable prospecting had been done for placer gold in the gravel of the creek bed, but, as far as can be learned, without success.

There is a story, of Indian origin, in circulation among the prospectors, of a "lost creek" in which, in the early days, two men discovered valuable placers, and took out considerable gold. One of these men died at the diggings, and the other, going south to winter among the Indians, died also, and with him all knowledge of the whereabouts of the creek. The Indians claim this creek to have been an eastern tributary of the Flathead, and some of the old-time prospectors are still searching for the lost diggings. No black sand or trace of gold could be observed in the river or any of the creeks, which fact, coupled with the geological formation of the mountains to the eastward, renders the existence of placer gold very improbable. No mineral float, or indication of mineral, was observed at any place in the district.

Coal.

To the eastward of the main Flathead river the rock formations forming the mountain ranges appear to be, and have been so classed by the Geological Survey, of an older age than the Cretaceous, which is the coal-bearing formation in this part of British Columbia; consequently, no coal may be expected in this district nor could any trace of such be found. In the southern portion of the district, to the west of the Flathead, the geological formation is more recent than on the east side of the river. From the few rock exposures visible in this heavily wooded section it is impossible to learn much in a hurried trip.

The hills along the valley of Calder creek are rounded off, the flanks being covered by wash which is chiefly dark shale and clay, through which a few outcroppings of light-coloured limestone and sandstone are visible. From the appearance of such formation as was seen, it is probable that it belongs to what has been classed by the Geological Survey as the "Fernie shales," and this section may possibly contain a small outlying basin of the Cretaceous or coal-bearing rocks, although no coal outcroppings are reported as found. This section has not been prospected, there are no trails in it and travelling is difficult.

On a small creek flowing from the north into Calder creek, about 10 or 12 miles from its junction with the Flathead, there were exposed beds of a black carbonaceous shale which contains concretions of claystone. These concretions, when freshly broken, give off a strong odor of petroleum, but examination of the creek for some distance up revealed nothing further. This creek is about on the boundary between Lots 4,589 and 4,593; it is impossible, in the absence of a survey, to say in which it is situated.

The northern portion of the Flathead valley has been examined in detail by parties of the Geological Survey and the outcroppings of the coal formations are shown in a "Map of the Crow's Nest Coal Fields" published by the survey within this past year. This map is based on actual triangulation and traverse surveys made by the Survey and show the coal measures of the Crow's Nest basin to be almost entirely to the west of the eastern boundary of Lot 4,589 and so, consequently, not within Lot 4,593. This coal basin is also shown as lying north of the east fork of Lodgepole creek.

On the headwaters of the Flathead and of the Lodgepole there are numerous exposures of the eastern edge of the coal measures of the Crow's Nest basin, and these have been prospected by various parties, exposing very promising coal seams.

These coal measures certainly lie very close to the boundary between the two blocks mentioned, and as such boundary has not been run out on the ground, the map of the Geological Survey is undoubtedly the best authority we have, and this places the coal exposures in Lot 4,589.

Oil.

Oil seepages have been reported from this section of British Columbia and also from the adjoining Territory of Alberta, certainly as far back as 1889, if not earlier. The late Dr. Selwyn, then Director of the Geological Survey, visited the district in 1891 with Mr. William Fernie, and in his report to the Hon. Edgar Dewdney, then Minister of the Interior, he says:—

"I found a decided boom in petroleum claims and a company formed to put down a boring, the site selected being 18 miles south, and a little east, of Pincher creek."

Speaking of the rock formation at the site of this venture, he says: "They were the ordinary varieties of sandstone and sandy shales of the Cretaceous."

Further on he tells of collecting a sample of crude oil from seepage through gravel, etc., in the bed of a stream about five miles to the east of the summit. He calls this Cameron Falls creek, but it is possibly the south fork of the Kootanie branch of Watertown river, as at this point oil is found seeping to-day and boring is going on at present to a considerable depth. Over the summit, in British Columbia, he speaks of oil on Kish-e-neh-na creek (he calls it Akamina brook, in error):—

"On the edge of a beaver-dam pool there were ledges of hard, dark-blue shale. Lifting layers of this at and below the water, a quantity of dark-green, circular patches of oil rose to the surface, and a precisely similar result followed by stirring up the mud in the bottom of the pool."

The finding of a trace of oil at this point has been reported to the Provincial Mineralogist by an old prospector who has been in the district for years. On the other hand, the Provincial Mineralogist camped on September 2nd and 9th on the spot described and was unable to detect or locate the seepage referred to. Dr. Dawson made a detailed examination of the geology of this creek in 1885, and must have also camped at this same spot, but he also failed to discover and record any oil seepage on this stream. The probabilities are that the seepage is very slight, or it may only show at certain stages of water.

In the same report Dr. Selwyn tells of his visit to Sage creek and of the finding of two seepages of oil on that stream. These the Provincial Mineralogist found, and they are described hereafter.

As far as could be learned or found on the ground, these are the only seepages in the district known to-day. It will be seen, therefore, that the discovery of oil is a matter of some standing, and that the close prospecting of later years has not added materially to the early discoveries.

Geology of Oil-Bearing District.

Sage and Kish-e-neh-na creeks are the only two streams upon which oil has been reported as actually found. These two creeks are parallel and closely adjoining, being only separated in their upper reaches by a spur of the main range. The seepages of oil reported occur on both creeks just where the mountains give way to the ancient wide valley of the Flathead, and it is quite certain that the geological formations are the same in both these creeks. This fact is immediately visible to the eye from the upper benches of the river valley, from whence the view obtained of the strata exposed on the ends of the mountain ranges shows them to have been at one time continuous. The valleys of these two creeks have been cut out by erosion, there being no evidence in the lower portions of these valleys of any faults, folds or anything more than slight bending of the beds. About three miles above the oil on Sage creek there is evidence of what appears to be a fault crossing the creek and affecting the strata; the mountains here are sheer and bare, enabling the formation to be seen, while on Kish-e-neh-na creek the hills are not as steep and are covered with slide material, obscuring the view of the various strata except upon the peaks; but the same fault probably also extends across the valley.

As to the rocks comprising this regularly bedded formation, they consist of shales, slates, quartzites, compact magnesia, limestones, sandstones and at certain places interbedded trap-flows. All are close grained, compact, and not capable of absorbing oil. The rocks in the upper beds are very red in colour, chiefly shale and slates, while lower down beds of light-coloured magnesian limestones, containing much siliceous matter, occur, bedded with banded sandstones and quartzites. None of these rocks are capable of absorbing oil, nor can they be suspected of being the source of any oil, as they are devoid of any appearance of carbonaceous matter. They have been referred by Dawson, by Selwyn and other geologists, to the Cambrian age, a formation older than the Carboniferous and very much older than the Cretaceous, in which latter the coal of British Columbia and also of Alberta is found. Oil had never been found in rocks of the Cambrian age, and the reported discovery of it rising through such was at first received with much doubt, until thoroughly substantiated by the Director of the Geological Survey, Dr. Selwyn, from personal observation. In the district itself there is no possible clue to the elucidation of even the possibility of such an occurrence, and it was only after the most careful and extended detailed survey of the whole range of mountains that any explanation was possible. On this point it is best to quote direct from Dr. G. M. Dawson, in the report of the Geological Survey for 1898:—

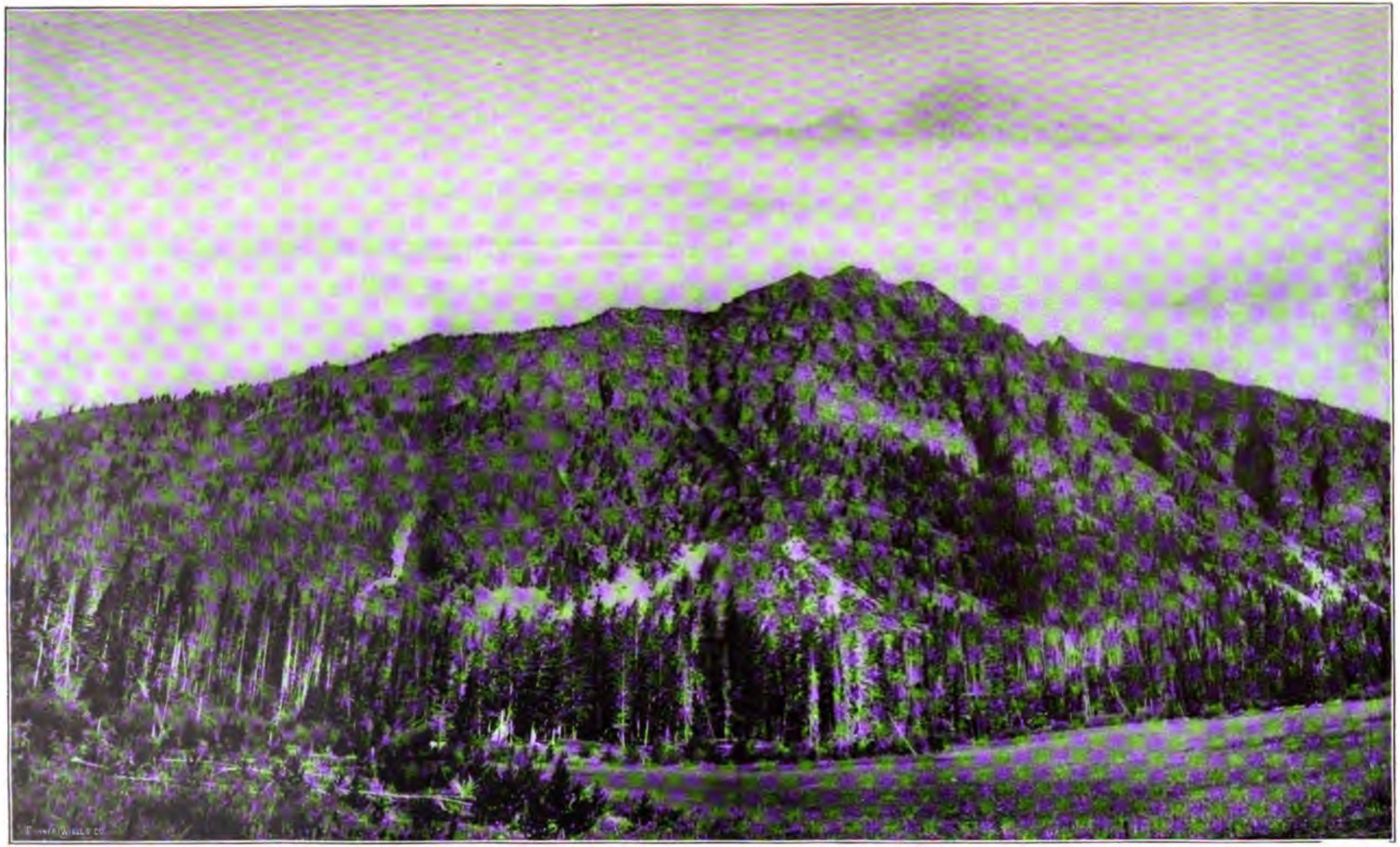
"The geological structure of the Rocky Mountain ranges proper, or that part of the western mountain region that lies between the eastern foot-hills and the great Columbia-Kootenay valley on the west, assumes a great practical importance in view of the opening up and working of the coal beds included within its area. On the map accompanying my preliminary report on that portion of the Rocky mountains between latitudes 49° and 51° 30′, forming part of Volume I. (1885) of the new series of annual reports of the Geological Survey, the areas of the Cretaceous coal-bearing rocks are represented with approximate accuracy, and in so far as the work carried out up to that date allowed. Several sectional diagrams were also given; but at the time the explorations to which this report relates were made, the existence of extensive 'overthrust faults' as a factor in mountain structure had scarcely been recognised by geologists. At a later date, the importance of such faults was very strikingly demonstrated, particularly in connection with the geology of Scotland, and it was realised that by tangential pressure, acting on the earth's crust, older beds may be bodily thrust forward upon newer formations for distances measured in miles.

"The position of the Cretaceous coal-bearing rocks at and within the eastern edge of the mountains on the Bow and Elbow rivers appeared to indicate the existence of an overthrust of this kind, but it was not until Mr. R. G. McConnell made his detailed examination of the Bow Pass, in 1886, that it was actually possible to state that the Palæozoic rocks had, in that vicinity, along the eastern point of the mountains, been thrust forward over the Cretaceous beds and up a gently inclined fault-plane for a distance of about seven miles, by pressure acting from the westward. This feature, as demonstrated in the vicinity of the Bow, is clearly shown in the sections accompanying the report cited.

"It had heretofore been supposed that a great normal fault, with downthrow to the eastward, defined the eastern base of the Rocky mountains in this vicinity and separated the rocks of the mountain region from the wholly Cretaceous and Laramie rocks of the foot-hills; but the structural discovery above alluded to at once threw doubt on the earlier supposition, as well as upon several of the sketch sections drawn in conformity with it in other parts of the mountains.

"It further appears to be quite possible that overthrust of the kind referred to may serve to explain the otherwise somewhat anomalous occurrence of petroleum in the southern portion of the Rocky mountains, between the Crow's Nest and South Kootenay passes. The actual existence of small quantities of petroleum in several places in this portion of the mountains was verified, some years ago, by the personal observations of Dr. Selwyn. The petroleum was actually found in parts of the mountain region characterised at the surface by very ancient rocks, probably of Lower Cambrian age. If it may be assumed, however, that these rocks probably overlie, in some places, those of the Cretaceous series, by reason of overthrusts, it is easily conceivable that the petroleum in question may have originated in consequence of heat, at considerable depths in the earth's crust, acting upon the fixed hydrocarbons contained in the rocks of that series."

The so-called "Big Oil Spring" on Sage creek occurs some 12 miles up from the mouth of the creek and about a mile above where the stream leaves the mountains and enters the flat depression of the Flathead valley. The rocks of the district were certainly not oil-producing, and so gave no indications as to the probable locality of the seepage, and the oil was only located, after some time, by the odour. The spring was found in the brush, about a quarter of a mile from the trail, at the base of the mountain to the north of the valley and near a small lake and marsh, which lie at an elevation of some 200 feet above the stream and 4,400 feet above the sea. The ground to the north of this lake is marshy and full of springs of water which go to form the lake. About 100 yards from the base of the mountain, on a knoll higher than its immediate surroundings, there is issuing a good-sized spring of water, and besides this spring were found several pools covered with thick, dark-green oil. The oil, being lighter than the water, accumulated nearest the highest point, the water flowing off below. The oil had accumulated here in several pools which covered an area of some 50 feet diameter, but, as far as could be determined, actually rose only within a radius of 6 or 8 feet, the remaining pools being formed by overflows. As the oil spreads itself out over the face of the water, all these pools have the appearance of being entirely oil, but an attempt to skim it off soon revealed the fact that it could not be collected by this means, but only by laying a cloth on the top of the pool and allowing it to soak up the surface oil and water, the cloth being then wrung out into a tin, from which the water was syphoned off from the supernatant oil. Samples of the oil were thus obtained and brought down for analysis. In appearance it is lighter than the crude oil of Pennsylvania, probably containing less tarry matter and being richer in the more volatile constituents. The following are the results of an examination made of these oils by the Provincial Assayer:—



SAGE CREEK, FLATHEAD RIVER, SHOWING LOCATION OF "BIG OIL SPRING."

No.	Where Obtained.	Specific Gravity.	Degrees. Beaumé.	Remarks.
1.	From tubing of bore-hole in Alberta, 5 miles east of summit....	.879	30°	Dark-coloured, heavy oil: commences to distil over at 90° C.
2.	From surface seepage at same point ...	.879	30°	
3.	From "Big Oil Spring," on Sage creek, B. C.....................	.828	40°	* Dark-green oil: commenced to distil off at 90° C.; 90 % of oil distilled off below 200° C., leaving 10 % of thick, dark oil containing tar, which latter is estimated at 5 %.
4.	From bed of Sage creek, near above (Leckie spring).................	.818	42°	Light-amber coloured oil: commenced to distil off at 90° C.; 97.5 % of oil distilled off at below 185° C., leaving 2.5 % dark, heavy oil containing some tar.
	California oils....................	.889 to .997 average .940	28° to 10° 19°	Commences to distil off at 150° C.
	Japan oils.......	.82 .98	41° 12°	

* Appliances were not available for complete or further fractional distillation.

It will be noted that both samples 3 and 4 are of exceptionally low specific gravity, and that sample 4 consists almost entirely of the lighter constituents of petroleum.

The oil rises through black marsh earth covered with charcoal, etc., resulting from the frequent ignition of the oil-soaked vegetable matter on the surface, and it is difficult to tell how much of its colour it owes to this source. This "spring" can only be described as an oil seepage; there is no flow and the quantity of oil therefrom is very small, probably not more than a couple of gallons a day.

The flow of oil here reported is exactly as it was observed in the last week in August, 1903. Conversations had [subsequently with prospectors of undoubted reliability, would indicate that the amount of oil issuing varies with the season and with different seasons, probably being influenced by the flow of water in the springs, the water seeming to bring the oil up with it. As far as could be noted, there are no warm springs in the district, all being very cold and very clear, having no mineral taste or smell.

The oil rises with the water, as already said, on a knoll. It is not a question of seepage out of any surface material, but of a spring coming up from the formation underlying the surface deposit and carrying oil. The immediate locality is surrounded on the surface by gravel wash, and if lateral flow existed it would be to the lowest level, which is the creek bed.

The place at which the oil is found is at the top of an anticlinal in the formation, that is to say, at the highest point in the bedding of the rocks, the axis of the anticlinal crossing the creek in a N. W. direction. From this point the beds dip up the creek to the N. E., and also down the creek, to the S. W. The beds can be traced dipping to the N. E. for about three miles, at first at a very flat angle, but gradually increasing until the dip reaches about 35°. At this point a fault occurs with, to the east, a different dip to the rocks, while further up the creek this is followed by other faults; hence it may be said that three miles above the "spring" is the limit in that direction of this possible field of accumulation.

To the S. W., that is, towards the valley of the Flathead, the beds dip at a very flat angle, probably not exceeding 10°, and apparently flattening out as they are lost to sight under the gravel and surface wash of the Flathead depression. In this depression no sign of solid formation can be seen, with the exception, possibly, of two or three places in the bed of the river (and these being covered with water could not be examined), where there seems to be a bed of yellowish clay shale lying flat, and which appears to be "in place" as a primary deposit.

On Kish-e-neh-na creek, at a point where oil is reported, a similar anticlinal fold occurs, but with the axis running nearly N. E. and S. W., or with the course of the creek, the beds dipping off at an angle to the N. W. and S. E. into the adjacent mountains.

In neither of these anticlinals is there any evidence of a break, and it is quite possible that below the faults referred to the overlying beds are unbroken and continuous to the S. W. over the whole area of the Flathead depression, for a distance of 10 or 12 miles north of the Boundary.

Directly across the valley of Sage creek from the "Big Spring" in the direction of the axis of the anticlinal and about half a mile distant, a second seepage of oil occurs in the bed of the creek, just at the base of the mountain to the east of the valley. Here, on the east side of the creek bed, is seen in place, and lying nearly flat, a bed of hard, dark, flinty shale from which issues a spring of clear water, rising in a small basin, some two feet in diameter, formed in the gravel. With this water there is given off constantly a gas, perfectly colourless, having a strong smell of the more volatile constituents of petroleum, and this gas, when collected in a vessel, burns with a yellowish flame, or, when mixed with air, explodes. The water in this little pool is quite clear and the gas can be seen to issue from the shales, but no oil can be seen here issuing as such. On the surface of the pool, however, a whitish scum collects and a piece of paper touched to the surface of the pool absorbs this scum, which does not discolour the paper any more than would water. The paper so saturated is easily inflammable. The occurrence seems to be rather a condensation by the cold water at this point of the lighter and more volatile constituents of petroleum, while the heavier portions may have been arrested below. For some little distance around, the shales show oil on their surface, and there is no doubt much more gas and oil exuding through them than this one little spring would indicate.

The amount of oil collecting on this and a couple of other similar pools is very small; it took a day of careful skimming and syphoning to collect a pint bottle full. In collecting the samples it was noted that, after it was in the bottle, there was a clear portion underneath the whitish-green and more viscous "scum"; this was at first thought to be water, but it was found that paper absorbed it quickly and that it was inflammable. The scum has, on standing in the bottle, become clear amber colour, with the colourless portion below. A careful analysis will have to be made of these two products to determine their character.

The two springs described are evidently at the ridge of the same anticlinal fold and are undoubtedly from the same area of accumulation, the one resulting probably from a fractional distillation only. If the oil should have been generated, as Dr. Dawson suggests, "in consequence of heat at considerable depth in the earth's crust, acting upon the fixed hydrocarbons contained in the rocks of that series" (Cretaceous coal-bearing rocks), then the oil so generated would rise until it met some impervious barrier of overlying rock formation, and if such rock should be in the form of an inverted basin (an anticlinal), it thus would collect and retain the oil.

Assuming the theory advanced as to the origin of the oil to be correct, and that it has been so generated in quantity, then there is a fair probability of there being underneath this "spring" a body of oil, because the overlying rocks are practically impervious, and the position in which they lie, an unbroken anticlinal fold, is such as would serve as a trap or reservoir in which it would be retained under pressure. The fact of the seepage being small does not argue against there being a large body of oil below, for if the seepage was large it would, in the ages past, have drained off the oil and there would be now no accumulation. As far as the disposition of the surface strata may serve as a guide, they would seem to indicate ideal conditions for such an accumulation, should the oil have been so generated.

If, by reason of an overthrust fault, the Cretaceous rocks *do* underlie at this point the surface formation of Cambrian age, then these Cretaceous rocks must be at very great depth, quite beyond all practical reach, so deep as to be affected by the interior heat of the earth so as to generate the oil in question. Oil so generated would rise until arrested by the barrier mentioned, and the question as to how far below the present surface this barrier may be it is impossible to determine, but, judging from the rock exposures seen to the eastward, the depth must be very considerable. Whether the depth of such oil-retaining barrier is beyond economic reach only very extensive boring operations can determine, although a detailed geological survey and sectional plan of the whole formation from this point well into Alberta might serve as a guide.

As to whether oil in quantity exists under this inverted basin of rock, there is little data upon which to base an opinion. Oil has been found, however, over a considerable area of country, as it exudes at the two creeks mentioned and to the S. E., some 12 miles more or less, at Kintla lake, in Montana, while on the same line of strike it has been found in small quantities. In Montana boring has been done to a considerable extent, it is reported to depths of over 1,200 feet, but without finding any quantity of oil.

About five miles over the Kish-e-neh-na summit into Alberta oil is found. There it occurs seeping through the gravel-wash on the bedrock of the creek, evidently coming out at some point higher up the valley. A few gallons a day have been collected there by washing the gravel in a sluice and collecting the oil from the surface of the water with cloths. Boring has been done here. One bore-hole was put down last year for over 1,200 feet, and it is reported that some oil was found at 1,120 feet down, but the quantity was small, and there is no flow nor has there been any production, although oil was seen standing in the "tubing" of the well and in the pit around the drill-hole.

A second drill-hole was being sunk this last summer by a Vancouver syndicate about half a mile further down same creek, and this hole was down over 1,300 feet without getting oil at that depth; this work is still in progress, while two or three additional bore-holes are being put in further down the valley, near the foothills.

These operations in Alberta are being carried on at a point very near the junction of the Cretaceous rocks and the older rocks which occur over the British Columbia summit, that is near the line of the supposed overthrust fault.

Economic Value of Oil Discoveries.

As to the economic importance of the oil in this district, it is very difficult at present from the data available to predict. The conditions may be summarised as follows:—The geological formation, as exposed in the hills and on the surface, is lying comparatively regular and flat. There is no local evidence of serious disturbance, so that from local observation it might be taken for granted that this great mass of conformably bedded deposit was "in place" in its geological scale. This formation has been classed as of Cambrian age by two successive directors of the Geological Survey of Canada. Oil has never been found *produced* in a geological formation as old as the Cambrian, nor do the rocks here exposed admit of the probability of their being the source of oil. Under anything but very extraordinary conditions, these surface geological conditions would seem to render it impossible for oil to occur in this section, but the stubborn fact remains that it is found there. It is, as Dr. Dawson very appropriately calls it, a "somewhat anomalous occurrence of petroleum."

In accounting for this fact, the explanation given by Dr. Dawson and already quoted seems the only one, viz.:—that these older rocks have been, by a gigantic "overthrust fault," slipped eastward over the Cretaceous (coal-bearing) beds of the plains for a number of miles, and that the subterranean heat, acting on these coal-bearing rocks, generated oil which finds its way up through the older but now overlying rocks. If this explanation is the correct one, the "overthrust" must have been very great indeed to bring the Cretaceous beds underneath the present oil seepage, as the Cambrian beds extend eastward from 12 to 15 miles from this point, in fact over the summit into Alberta.

The oil might have travelled westward underground for some distance, but this is not probable, as a few miles to the eastward of the point of occurrence of the oil there are several faults which have the appearance of being profound, and would, therefore, have allowed the gas and oil to rise to the surface through them, but of this there is no indication. This latter fact does not prove that oil has not been generated in this faulted region, as it may have travelled eastward along the main fault seam, and it may be that which is found seeping in Alberta.

As to whether there is oil in quantity to be obtained by boring, there is little evidence; the seepage at present is trifling, but the geological structure seems suitable for the retention of oil if produced in quantity. If it does so exist it must in all probability be at a very considerable depth, possibly over 3,000 feet.

In conclusion, I would report: the actual seeping of oil in three or more places; that the existence of a body of oil underground is quite possible, though exceedingly problematic; that if such body of oil does occur it can only be demonstrated by boring in all probability to a considerable depth and at a considerable cost.

FORT STEELE MINING DIVISION.

REPORT OF J. F. ARMSTRONG, GOLD COMMISSIONER.*

I have the honour to report on the progress of mining in Fort Steele Mining Division during the year 1903.

There are now 137 mineral claims held under Crown grants or certificates of improvements, and during the year 200 new locations and 335 certificates of work have been recorded. The following are mineral claim statistics:—

Sections.	Held under Crown grant or Certificate of Improvements.	Certificates of Work Issued.	New Locations.
North-East	....	10	3
East Centre	29	66	38
South-East	4	20	33
South-West	26	40	26
West Centre	83	194	95
North-West	....	5	5
Total for 1903	142	335	200
" " 1902	117	451	253
" " 1901	104	642	455
" " 1900	71	704	470
" " 1899	37	718	729

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*See also Report of Provincial Mineralogist, page 73.

In very few instances has development work exceeded the assessments which have been recorded. The depression in mining business has reduced the prospecting to a very low point, nearly all the new locations being old discoveries relocated in new names. In previous reports I have divided the district into six sections, and I continue the same arrangement.

NORTH-EAST SECTION.

This section, which includes the drainage area of Wasa, Sheep and Wolf creeks, and of the Kootenay river between these points, has never been much prospected and is distant from railway transportation.

EAST CENTRAL SECTION.

This section comprises the drainage area of the eastern side of the Kootenay from Lewis creek to Bull river, excluding all territory south of Bull river. Much work was done in this area in former years, but no shipments of ore, except for sampling, have ever been made. The *Estella Group*, on Tracy creek, will probably commence shipping during the coming year. There is no railway in this section, but the proposed Kootenay Central Railway would traverse it from end to end.

SOUTH-EASTERN SECTION.

This section includes the eastern drainage area of the Kootenay river below Bull river, and the drainage area of the Flathead river. Nothing beyond development work has ever been done in this section on the mineral claims, although most of the properties are within a few miles of the railways.

SOUTH-WESTERN SECTION.

This section comprises the western drainage area of the Kootenay below Wardner and the drainage area of the Yahk and Moyie rivers. The railway gives transportation to Moyie lake, Lower Moyie river and Palmer bar. The *St. Eugene* mine and *Society Girl Group*, both of which have shipped ore, are in this section. No ore has been shipped during the past year, but much work has been done on the *St. Eugene* in perfecting machinery, defining the "ore in sight," and in arranging a new slime concentrating process for handling the slimes and tailings of the mill.

WEST CENTRAL SECTION.

The drainage area of the St. Mary's river and its tributaries are included in this section. North Star hill, Sullivan hill and part of St. Mary's river are close to railway transportation. The *North Star* and *Sullivan Groups* are in this vicinity. Their output in former years was large, and this year in September and October small shipments were made from the *North Star Group*, on which development work is being continuously prosecuted. The *Sullivan Group* has also made small shipments during the latter part of the year from its dump. On the *Badger* and *Red Mountain Group* and the *Roaring King Group*, on Perry creek, development on a fair scale has been done.

NORTH-WEST SECTION.

This section which comprises the drainage area of Cherry and Skookumchuck creeks, is situate at a distance from all railways and little has been done during the year.

PLACER MINING.

Work during the present year has been confined to Wild Horse creek and Bull river, in the East Central section; Perry creek, in the West Central section, and the Upper Moyie river and its tributaries, in the South-western section.

On Wild Horse creek the usual amount of work has been done by Chinamen. One company of white men have gone to considerable expense in opening a part of the *Invicta* mining leases, without much return so far, although another season is likely to be more profitable.

On Bull river the Gold River Mining and Power Co., in developing the water power, intend to divert the stream and mine the diggings in the bed of the river. The undertaking is a serious one, and the company has installed a saw-mill to cut lumber for its flumes. Some time must elapse before mining begins.

On Perry creek three companies are working, each on a different principle. Near Oldtown the Theis Company is sinking a new shaft to bedrock, work on the old shaft having been profitable; the Perry Creek Hydraulic Mining Co. is constructing a flume two miles in length and will work bench diggings by hydraulic power, commencing near the Falls; while the East Kootenay Placer Mining Co., further up the creek, has taken in a railway steam-shovel with which to raise the gravel from bedrock, and is now perfecting the machinery for handling the gravel between the steam shovel and the flumes.

On Moyie river no work has been done, but several applications for mining leases have been advertised. A little work has been done on Weaver creek, a tributary of the Moyie.

COAL MINING.

* The Crow's Nest Pass Coal Company owns all the working collieries in the district. These are situated at Michel, on Coal creek, near Fernie, and at Morrissey, all in the Southeastern section of the district. The production of coal and coke at these points was as follows:—

COLLIERY.	1902.		1903.	
	Coal (gross).	Coke.	Coal (gross).	Coke.
Michel ....(tons 2,240 lbs.)	113,853	29,347	235,347	64,818
Coal Creek....................... " "	238,776	78,490	215,791	84,321
Morrissey.. .. .. " "	41,332	....	138,750	625
	393,961	107,837	589,888	149,764
Net coal................. .... " "	223,501	....	340,337	....

This shows an increase of about 50 % in coal and nearly 40 % in coke. The number of men employed in the mines has been:—

	1902.		1903.
Michel..........	220	......	524
Coal Creek	561	......	441
Morrissey	203	......	306
Total................. .	984		1,271

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* For fuller information concerning these collieries, *See* "Coal Mining in the Province."

Coal and Oil Prospecting.

During the year 191 coal and oil licences have been in force in the Elk River valley distributed as follows:—

Group 1, on west bank Elk river,	near Morrissey	6 licences.
" 2, " "	opposite Fernie	13 "
" 3, " "	40 to 48 miles north of mouth of Michel creek	16 "
" 4, on east bank "	40 to 50 miles north of mouth of Michel creek	19 "
" 5, " "	28 to 40 miles north of mouth of Michel creek	46 "
" 6, on Fording river,	west and north of Lot 4,588	79 "
" 7, on Fitzgerald creek,	" "	12 "

Development work has been done on most of these, 67 renewal licences having been granted.

In the Flathead valley, 697 notices of application for coal prospecting licences have been advertised in the British Columbia Gazette.

Office Statistics—Fort Steele Division.

Mineral claims recorded	199
Placer claims recorded or re-recorded	1
Partnership placer claims recorded or re-recorded	2
Certificates of work recorded	297
Payments in lieu of assessment work	3
Certificates of improvements recorded	27
Conveyances or other documents of title recorded	78
Partnership agreements recorded	3
Gold Commissioner's permits recorded	1
Documents filed	22
Affidavits filed	531
Record of water grants and permits	5
Mining leases issued	4
Mining leases in force	23
Free miners' certificates, ordinary	458
" companies	6
" special (individual)	1

Revenue.

Free miners' certificates	$2,529 50
Mining receipts	5,232 25
Mineral tax	374 89
	$8,136 64

NORTH-EAST KOOTENAY DISTRICT.

WINDERMERE MINING DIVISION.

REPORT OF PROVINCIAL MINERALOGIST.

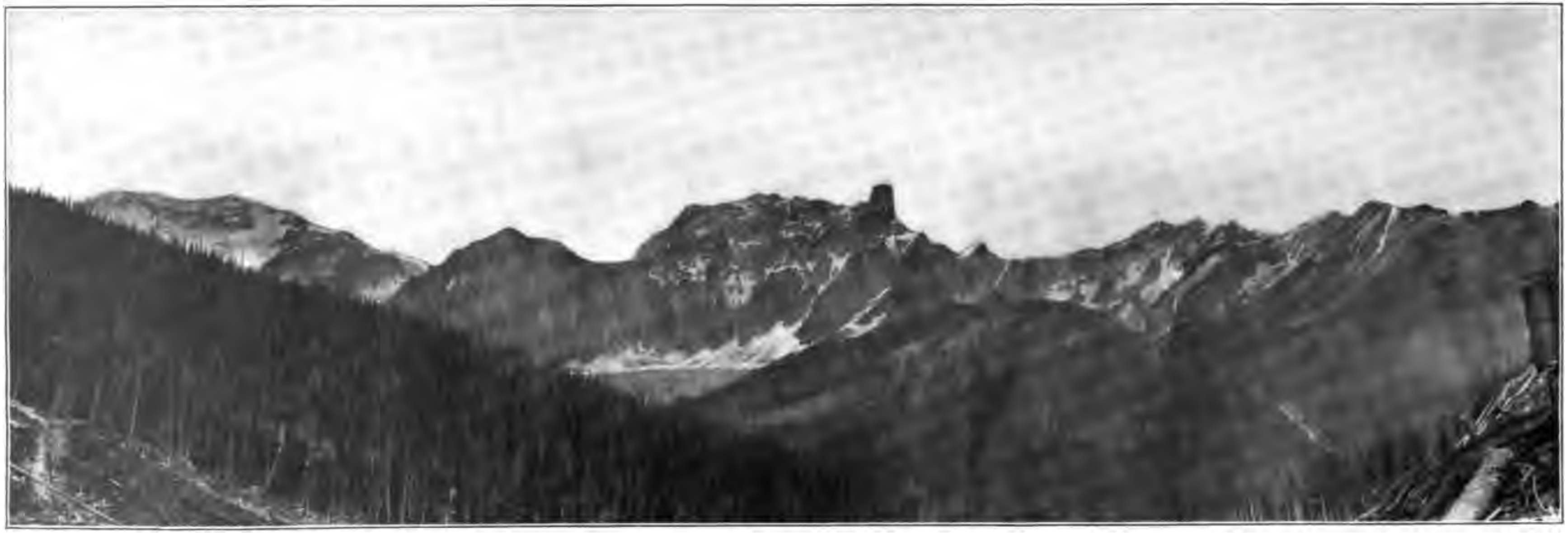
On July 17th the Provincial Mineralogist started from Cranbrook by stage for the Windermere District, to note the progress made in mining in that neighbourhood. During last summer (1903) the stage left Cranbrook, on the Crow's Nest branch of the C. P. R., once a week, on Friday at noon, passing through St. Mary's Mission, Fort Steele and Wasa, and arriving at Windermere on Sunday at noon. From Windermere an auxiliary stage continues to Wilmer, arriving the same afternoon. During the summer months a semi-weekly steamboat service from Golden to Windermere offers the more comfortable means of going into the district, and by this route practically all the freighting in and out of this section is conducted.

The stage route from Cranbrook passes Findlay creek, the scene of the operations of the "Thunder Hill Co." On this Company's property no further work has been done, and it is reported that the machinery in the concentrator has been sold for removal to near Fort Steele. On Findlay creek there has, this past year, been a revival of placer gold mining, and a syndicate of Rossland men was at work a few miles up the stream testing certain gravel deposits, in which gold had been found. Considerable work had been done in prospecting, and at that time a large canvas hose was being brought in to fully test the bank by hydraulic methods, for which an adequate water supply is assured. No practical results had then been obtained, and no authentic information has since been received as to the outcome of the season's work.

The Mining Recording office of this division is at Windermere, a small town most beautifully situated on the east shore of Lake Windermere, and here there are also a couple of good stores, hotels, churches, a school, post office and telegraph office.

Formerly some mining was carried on at the *Swansea* mineral claim, situated on the hill to the east of and overlooking the town, but for the last few years no work has been done on this property. Latterly the mining locations and development of the district have been almost exclusively in the range of hills to the west of the Columbia valley, and which separates the latter from the Duncan river valley. Of this work the most successful and extensive operations have been on Toby, Horse Thief, No. 3, and other creeks flowing from the west into the Columbia river, at short distances below where it flows out of Lake Windermere. This development has caused three more or less successful townsites to spring up on the west side of the river, near the old "Salmon beds." Of these towns Wilmer is the nearest to the mines and is the largest, having good stores, hotels, etc.; it is situated about three-quarters of a mile back from the "Landing" at the river, on a bench where the Horse Thief and Toby creek waggon roads join.

The rock formations seen in the mountains to the east of the Columbia river are those of the main Rocky Mountain range, chiefly dolomitic limestones interbedded with shales, slates and sandstones, a formation which has not, in British Columbia, been found productive of economic minerals. The mountains to the west of the river are chiefly composed of shales, slate, schist and quartzite, with little limestone, all of which have been much folded and disturbed, and occasionally altered, by igneous intrusions. The district was fully reported upon



VIEW FROM PTARMIGAN MINE, McDONALD CREEK—WINDERMERE MINING DIVISION, S. E. KOOTENAY.

in 1898, and of the properties then located and described the only one which has made any shipments is the *Delphine.* On this property some development was done and the lead of clean galena referred to at that time has been all mined. One of the owners latterly in charge of the work informed the writer that no further extension of clean ore had been found, that as yet no attempt had been made to treat a low grade concentrating ore, and that the property was at present not being operated. The shipments for 1902 amounted to about 48 tons, and in 1903 about 12 to 15 tons. This ore averaged about 25 % lead and 135 ozs. silver.

Since 1898 a number of very promising prospects have been located, and two properties, the *Paradise* and *Ptarmigan,* have developed into shipping mines. These are described in detail later.

Of the properties recently located and developed, the *Lead Queen,* on No. 3 creek, appears to be the most successful, and is reported as having a very large "showing" of galena ore, from which samples have been assayed, giving 60 % lead and 30 to 40 ozs. silver per ton. Some 200 to 300 feet of underground work has been done, with satisfactory results. The present low price of galena ore, taken in conjunction with the cost of transportation, has not offered much inducement to fully develop the property under existing conditions.

Situated opposite Windermere and near the lake is the *Bunyan* property, which has produced some good samples of sulphide of copper, carrying small silver values.

Ptarmigan Group Mines.

The property formerly known as the *Red Line,* or *McDonald* mines, is now called the *Ptarmigan* mines, and is owned by the "Ptarmigan Mines of the Selkirks," a syndicate of eastern American investors, under the local management of Mr. Thomas Starbird, of Wilmer, B. C. The group includes the following Crown-granted mineral claims:—*Red Line No. 1, Red Line No. 2, Iron Cap, Iron Crown Fraction* and *Contention Fraction.* The mine is situated in the basin at the head of McDonald creek, a branch of Horse Thief creek, at an elevation of 8,500 feet above sea level, and a distance of about 27 miles from the town of Wilmer, on the Columbia river, from which point a steamer connects in summer with the Canadian Pacific Railway at Golden. A very good waggon road has been built from Wilmer to the mine office and compressor plant at the lower terminal of the aerial tramway, which is at an elevation of 6,500 feet. This road follows up Horse Thief creek, and for about half the distance has an easy grade and was not difficult to build, but shortly after passing "Blowfly," where the manager's house is situated, it enters a narrow part of the valley, where the steep and rocky sides have necessitated heavy work and called for considerable engineering skill on the part of Mr. T. H. Taylor, the company's engineer, to complete the undertaking. This has been done at last, but at the expense of some sharp curves and heavy grades, which fortunately, however, are mostly "down hill" from the mine. The mine has already been described in previous reports, so that a further summary only is necessary.

Red Line Claim.

In the steep hill on the south side of the basin, just below a glacier, a couple of veins were found cutting into the hill with a dip nearly vertical. The country rock appears to be dark silicified limestone, with argillites and quartzite. Surface prospecting above the outcrops is prevented by the glacier, from under which, however, rich float is obtained. The glacier keeps the ground in a frozen condition even in summer, thus increasing the difficulties of mining. On the smaller of these veins a tunnel has been driven for 300 to 400 feet, following a marked quartz fissure vein, which carries a paystreak a few inches wide, containing ore consisting of iron pyrites and tetrahedrite, assaying high in silver with some gold. This paystreak, though small, was found to be so rich that the lead was later cut by another tunnel about 125 feet deeper, and here about the same amount of drifting was done, a raise being also made connecting the two. The work done on this lead proved the vein to be well defined and continuous, although the paystreak at points become very narrow, while the tonnage of ore produced for fathom of tunnel driven was small. Selected samples of this ore are reported to have given 600 oz. in silver and .75 oz. in gold. On the larger vein a tunnel, driven at the same level as the lower tunnel of the small vein, has been run in about 400 feet, with two cross-cuts to the small vein tunnel. As the development proceeds there are some indications which lead to the belief that these two veins may eventually join. On the "Big Lead" the fissure is not so clearly defined and assumes more the appearance of a strong impregnation of the country rock, along a fissure, with mineral sulphides and quartz, and this may be considered the ore body here. In one place this ore body widens out to 30 feet, again pinching down to a few inches. The length of this wider ore chute is estimated at 50 to 60 feet. Where the ore body was widest preparations were being made to sink a winze; at the time the property was visited the hole had been sunk for some 10 to 15 feet, and was still carrying the ore at that depth. The total length of workings in the mine was estimated at 3,030 feet, made up as follows:—Drifts, 2,645 feet; winzes, 150 feet; raises, 235 feet. No reliable data could be obtained as to exactly what the assay on an average sample of this ore body would be, although the ore was admittedly too low grade to stand shipping without concentration. The ore consists of quartz and rock carrying a considerable proportion of iron pyrites, with varying proportions of tetrahedrite (gray copper), and the values seem to be chiefly associated with and contained in this latter mineral. Small shipments of sorted ore have been made which gave smelter returns as follows:—Copper, 4.1 %; silver, 237 oz., and gold, 0.41 oz. per ton. The silver values of the ore seem to be nearly in proportion to the gray copper contained therein, and concentrates therefrom run as high as 1,000 oz. silver per ton, while the gold values are with the iron pyrites.

A concentration by water of the gray copper from the iron pyrites and quartz was recognised as impossible; consequently, a lot of the ore was sent to New York for a trial of concentration by the Wetherill Magnetic Separating Co., the results of which have been kindly furnished by Mr. Starbird, and are here given as being of more than local interest. It is perhaps unfortunate that the ore sent was sorted too high to make the test of much practical value to this property, as it in nowise represents the bulk of the ore. As a matter of fact, indeed, the ore sent was so highly sorted as not to require any concentration, but could be well shipped as it was.

The following is an analysis of the ore sent from the Ptarmigan mine, Wilmer, B. C., as reported by the Wetherill Company:—

ANALYSIS OF ORE TESTED.

Copper	11.09	per cent.
Zinc	trace.	
Iron	22.67	"
Sulphur	31.38	"
Antimony	10.78	"
Bismuth	0.15	"
Silica	16.32	"
Gold	0.73	oz. per ton.
Silver	416.47	" "

Test of Silver Ore by Wetherill Separating Company, March 31st, 1902.

Original.					Poles 3 & 4, 15 Amperes.				Poles 5 & 6, 28 Amperes.				Non-Magnetic Tails.			
Size.	Weight. Grms.	Copper. %	Silver Oz.	Gold. Oz.	Wght. Grms.	Copper. %	Silver, Oz.	Gold. Oz.	Whgt. Grms.	Copper. %	Silver Oz.	Gold. Oz.	Weight. Grms.	Copper. %	Silver Oz.	Gold. Oz.
10 to 20	39,615	6.94	233.25	0.45	9,675	22.59	858.75	0.67	1,710	9.70	358.70	0.55	28,230	1.85	67.20	0.50
20 to 40	20,170	7.05	273.80	0.55	4,700	23.72	910.40	0.50	1,300	15.59	580.25	0.75	14,170	1.15	42.18	0.49
40 to 80	10,880	6.54	248.97	0.52	2,240	27.28	1,090.80	0.50	240	16.18	592.40	0.87	8,400	0.9	32.75	0.50
80 to 200	7,430	6.33	241.35	0.50	1,070	27.53	1,049.30	0.45	290	15.85	982.50	0.53	6,070	1.55	63.85	0.48
Dust E..	7,000	7.03	277.50	0.53	......	......	....	......	......	......	......	......	....	......	......	......

The writer had the opportunity of witnessing at the Wetherill Company's plant in Newark, N. J., this fall (1903), treatment of some ore from this property, and, as far as the eye could judge, the separation was very complete.

From experiments witnessed it was seen that certain samples of tetrahedrite, zinc blende, &c., when pure, were not magnetic, whereas certain other samples were quite magnetic, probably from the presence of a small quantity of iron combined therein. The Wetherill people say that no chemical analysis will tell whether any mineral is magnetic or not under high powers, and the only way to find out is to try it practically.

The future prospects of this property, and of many others in British Columbia, are dependent upon the ultimate success of this method, and the practical results of working tests will be awaited with much interest.

Plant.

A Bleichert aerial tramway, with a nominal capacity of 200 tons a day, was under construction from the mine tunnel, elevation 8,500 feet, to a point at an elevation of 6,500 feet, a distance of 7,550 feet, and was nearing completion. At the lower terminal bins were being built, and a magnetic concentrator was contemplated, the plans for which were all prepared, although no construction had been started. At this point a Riedler straight line air compressor, supplied by a 96-h.p. Babcock and Wilcox and a boiler had been erected, the compressed air being sent up to the mine in a 5½-in. iron pipe line, and supplying the two or three drills which were at work. At the end of the waggon road, at the compressor site, the company had erected a superintendent's office and a boarding-house for employees, while half way up to the mine, at an elevation of 7,500 feet, was located the mine-bunk and cook-house and the mine foreman's office. The combined bunk-house capacity is for 75 men. About two miles down the waggon road, at an elevation of about 5,500 feet, and near McDonald creek, the company had erected a saw-mill and planer to supply the property with lumber for construction purposes, and which is also used to cut up wood for the compressor boiler. A telephone line has been built from Wilmer to the mine, with stations at Blowfly and at the compressor plant.

McDonald creek will supply abundant water power for all mining and concentration purposes. It has been planned to eventually utilise this by erecting a power-house near where the creek crosses the waggon road, from which point the power will be transmitted as electricity to wherever it is required.

The company's *Iron Cap* claim, over the summit from the *Red Line*, has not been worked for two years. Some 1,200 feet of tunnels, &c., are reported thereon. The ore is galena, and at the present time it is not considered rich enough to mine.

Paradise Mine.

The *Paradise Group* consists of some 9 claims situated in Paradise basin, at the head of Spring creek, a small stream which flows into Toby creek from the north, about 20 miles from its mouth. The property is

330717

held by an Eastern Canadian syndicate, represented by R. R. Bruce, who is the local manager of the properties. From Wilmer a waggon road has been built up Toby creek by the Government to "Pinehurst," the company's store-house, barns, etc., at the foot of the mountain. From here the company has constructed a very fair waggon road, winding up the hillside to the basin, at about 7,000 feet elevation, at which point is situated the company's mine office, store-house, bunk and cook-houses, etc., buildings which are suitable for the preliminary development of the property.

The formation in the vicinity of the mine consists of shales, slates, sandstones, etc., with occasional beds of limestone, all very much contorted and folded, with numerous small faults, but as a whole not seriously broken. From the basin the mountain rises to the east, at an angle of about 30°, for a height of some 800 to 1,000 feet, measured to the lowest point in the saddle or lowest part of the divide. The hillside is devoid of trees, the surface being covered with loose, brownish shales, through which, occasionally, outcroppings of the same rock *in situ* are seen, lying here tilted to an angle of approximately 60°, with a strike diagonally across and over the low saddle-back range. Such at least is the strike given by the workings, although on the summit of the ridge there are indications which render it possible that towards the top of the latter the strata may have taken a bend and run more nearly parallel with the ridge.

At the No. 1 tunnel, about 650 feet above the basin, following the stratification of the shales, there had been found outcropping a vein or zone filled with red oxides of iron and lead carbonates with some galena. This lead had been followed in, by a tunnel and incline, which "follow the ore," and are therefore somewhat irregular in plan, for several hundred feet of workings, including raises and drifts extending above this level. The general width of the lead is estimated at about 4 feet, underlying which is a layer of clay or gouge, in some places from 12 to 18 inches thick. This vein was traced diagonally down the hillside, and at 125 feet vertically lower No. 2 adit tunnel was driven in on the lead for a distance estimated at about 500 feet. From this second tunnel level connection was made, in ore, with the No. 1 tunnel; a winze had also been sunk for about 150 feet, still carrying ore.

Some 250 feet vertically lower, on the outcrop of the lead, there had been run in No. 4 adit tunnel, which still found and followed the lead, but in which ore was not so abundant. It must be noted in this connection, however, that the slope of the hill being about 30°, a very long tunnel is necessary to get under the dip of the large ore bodies developed above, and the point required had not been reached at the time the property was visited. Subsequent information derived from Mr. Bruce shows that this No. 4 tunnel is now in about 1,000 feet from the portal, but is not yet under the upper main ore bodies, which point, it is estimated, will be reached in March or April, 1904, when systematic cross-cutting will be begun on this level.

The winze from No. 2 tunnel, already mentioned, and known on the company's plan as "Shaft 885," is now below the No. 3 level, which latter is to be run "blind," or from the winze, and not opening to the surface. This level has now been started away from the winze and the first cross-cuts are being made, the vein filling at this depth being still of the same oxidised nature seen in the upper levels.

The lead, it will be thus seen, is traced in depth to the fourth level, and for a length of 1,000 feet. The workable ore is proven to the third level, and there is every reason to think that it will soon be proved to the fourth level also. The lead matter, as already said, is iron oxide with carbonates and sulphides of lead associated with silicious lime (analysis about 20 % SiO, 25 % CuO, with 25 to 30 % Fe.) The lead is either a replacement of a stratum in the shales, originally largely or wholly composed of lime, or the lime has been deposited from adjacent lime beds, in and with the lead matter, in a foliation of the shales.

In the course of the work done over 1,600 tons of first-class or shipping ore has been actually shipped, that is, about 2,000 tons have been extracted. This ore has largely been sorted in the mine, or rather no attempt has been made to mine any but first-class ore, which, from actual smelter returns, runs about 50 oz. silver and 60 % lead. Although no attempt has been made to mine second-class ore, yet on the dump there were some 4,000 tons, estimated to run about 35 oz. Ag. and and say 35 to 40 % lead. In the mine workings much ore is actually "in sight," and more is demonstrated almost to a certainty. A rough calculation made at the time (July, 1903) gave, if not of ore actually "blocked out," certainly of "probable ore," about 50,000 tons, which amount, there is every reason to expect, has been largely increased by subsequent developments.

The ore is rather too low to be shipped under existing conditions of transportation, etc., without having a great percentage of the values consumed by charges; the management, therefore, is only shipping the best ore "to pay its way," and has in contemplation the erection of a smelter at Pinehurst, at the foot of the hill. With ample capital, with a very large body of ore actually developed and a practical certainty of much more to be developed, and with ore and lead matter of such character as to be nearly self-fluxing, it certainly would seem as if the erection of a lead blast-furnace was amply justified, even by the present development.

A survey has been made for an aerial tramway from the mine to Pinehurst; an exceedingly practicable line has been located and bids obtained for its construction, but it is understood that nothing will be done until No. 4 tunnel has been more fully developed, as such development would materially affect the location of the terminals and line. There is little question but that the line must be built soon, as the saving to be effected on the transportation of the ore in sight from the mine to Pinehurst, say $1 a ton, would more than repay the cost of the tramway.

The company has constructed a private telephone line from Wilmer to the mine, a distance of 20 miles. At Pinehurst the company has laid off a townsite, cleared some land, erected a large barn, a good cook-house, a large store-house, with office for manager, and a sort of half-way stopping place, all built well and substantially of logs. An excellent site has been selected for a smelter, if one is built, with ample water-power, etc. The company owns a considerable acreage of fine timber land, extending from Pinehurst to the mine, through which the tramway line would pass, and a site has been laid off here for a complete saw-mill plant. At Wilmer the company has a manager's house and office, with large stables, etc.

The policy of the company, as indicated by the operations, has been careful and conservative. No expenditure has been made that was not immediately necessary, and no more than was necessary, a "better be sure than sorry" policy which is sufficiently rare and commendable to be worthy of special notice.

Silver Belt Group.

The *Silver Belt Group* of claims, extending from the *Paradise* mine property, across the basin, up and over the opposite divide, consists of the *Silver Belt*, *Carbonate*, *Silver Belt Fraction*, *Sunshine* and *Silver Crown* mineral claims, all held by the Silver Belt Mining Company, a corporation with $100,000 capital, in $10 shares, of which Mr. C. M. Keep, of Kendrick, Idaho, is President. In the upper end of the basin a shaft was found which had been sunk 25 feet on a very good showing of high-grade lead carbonates and sulphides. This shaft could not be examined critically, as it was much caved and filled from effect of winter snows. As far as could be observed, this showing had not been traced out for any distance by either drifts or open cuts. A second shaft was found a short distance to the south, and was also down 25 feet, at which depth a fault was said to have been encountered which temporarily cut off the ore and evidently discouraged the management, for no serious attempt was made to pick up the ore again, a matter to be regretted, since the showing in the shaft, chiefly iron sulphides carrying silver, was good enough to justify more exploratory work, especially now that the development of the adjoining and similarly situated property has proven successful.

Some little distance up the hillside a tunnel has been run in for 100 feet, it is reported, on a crushed zone lying along a fault fracture, and in which some ore was found. This tunnel was partially caved and nothing further could be learned from it.

In 1901 the company shipped about 15 tons of ore, averaging about 218 oz. silver to the ton, and said to have netted $1,456.

The company has no buildings in this basin and no work was being done on the property.

There are several other claims and groups of claims in the immediate neighbourhood which have good surface showings and which, with some work, should develop bodies of ore.

Of those in the immediate vicinity might be mentioned the *Shamrock Group*, consisting of six claims, which adjoins the *Paradise* on the north side and just over the saddle-back divide, being on the Boulder creek slope. The ore body in the *Paradise*, if continued in the trend of the present workings, would enter *Shamrock* ground, and it is contended by the owners of the latter that it does so, but proof of such contention will only come with development.

WINDERMERE MINING DIVISION.

*REPORT OF J. E. GRIFFITH, GOLD COMMISSIONER.

The past year has witnessed substantial improvements in mining operations in the Windermere Mining Division, and although many promising properties remain idle through lack of capital, it is slowly but surely attracting attention. The *Paradise* and *Ptarmigan* mines are being systematically developed, with very good results.

Paradise Group.

This property is situated on Spring creek, a tributary of Toby creek. In the course of development the mine has shipped about 3,000 tons of ore, close on 1,000 tons being shipped this summer, and a waggon road has been completed from the Toby creek road to the mine, a distance of about eight miles on a ten per cent. grade, with the exception of only 2,000 feet, which is on a 12 per cent. grade. A tramway is in contemplation from the mine to Toby creek, the length of which will be about two and a half miles. The mine is connected with Wilmer by telephone and a portable sawmill will be working next summer. The development work consists of:—No. 1 level, 100 feet; main incline, 264 feet; intermediate levels, 320 feet; No. 2 level, 1,005 feet; No. 2 level cross-cuts, 375 feet; winzes, 220 feet; raises, 200 feet; No. 4 level, 832 feet; No. 4 level cross-cuts, 293 feet; total, 3,609 feet.

Work done during the past 12 months:—No. 2 level, 553 feet; cross-cutting, 140 feet; sinking, 120 feet; raising, 200 feet; total, 1,013 feet.

It is expected that the vein in No. 2 level will be struck about 150 feet from the present breast.

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*See also Report by Provincial Mineralogist, pg. 96.

The *Silver Belt Group*, which is situated in the Paradise basin, has been idle for some time; the ore is a high-grade galena rich in silver. The property is owned by the Silver Belt Mining Co.

The *Shamrock Group*, situated near the Paradise basin, consists of six claims. Development work during the past season was confined chiefly to the north side of the hill, with encouraging results. Work will be continued in the spring and a Crown grant applied for.

On the *Silver Crown Group*, also situated in the Paradise basin, on the *Silver Belt* lead, development work consists of open cuts and a 200-foot tunnel.

On the *Diamond C. Group*, situated on Spring creek, close to waggon road, considerable work has been done, with good results.

The *Outcrop* and *Outlook* are situated on the North Fork of Toby creek. Development work consists of numerous open cuts. The lead averages 2 feet in width and has been stripped for 400 feet, showing ore all the way. Assays run as high as 100 ozs. in silver and 70 per cent. lead, with some carbonate going as high as 500 ozs. in silver. The formation is a blue limestone.

On the *Washburn* and *Deserter*, situated on the North Fork of Toby creek, development work consists of numerous open cuts in a blue limestone formation. The lead averages a foot in width and has been stripped for 250 feet. Assays have given 80 ozs. in silver and 75 per cent. lead.

On the *Black Diamond*, situated on Toby creek, the owners have installed a winter camp, and the 30-foot tunnel will be extended another 250 feet. The paystreak averages 11 inches in width. The solid ore assays well in silver and lead, with about 6.3 % iron, 14 % silica, and some zinc.

On the *Hot Punch Group* only the necessary development work has been done during the past year. A survey of this promising property was completed and Crown grants will be applied for during the ensuing year.

The *Mineral King* is situated on Toby creek. The ore-bearing body appears to be about 150 feet wide, and through it there run in all directions ore stringers of about eight inches across, occasionally widening out. For the amount of work done it seems to be a promising property.

The *Bullion Group* is situated on Toby creek, in a black slate formation, the ledge being about 20 feet wide and well mineralised. Assays of 80 ounces in silver, 76 % lead and from a trace to $12 in gold have been obtained.

The *Samson* claim is on a continuation of the *Mineral King* lead. Development work consists of two short tunnels and open cuts. Samples assaying $150 in silver and a trace of gold have been obtained.

The *Lenora Group* is situated on Jumbo Fork and consists of three claims. The ore is a chalcopyrite carrying substantial values in silver.

On the *Charlemont Group*, situated on the south side of Toby creek and consisting of four claims, considerable work has been done in the past, with encouraging results.

On the *Duchess* and *Nickel Plate*, situated on Dutch creek, the ledge is said to be 12 feet in width, the ore being chalcopyrite carrying from $4 to $10 in gold. Only assessment work has been done this year.

The *Bunyon Group* is situated about four miles from Windermere lake, and consists of four claims in a slate and schist formation. The lead is said to be about 16 feet in width, and from a paystreak of 3½ feet in width assays were procured giving 16 per cent. copper and 16 ounces in silver. Development work on the *Bunyon* consists of an 87-foot tunnel, tapping the lead at a depth of 35 feet, a drift on the lead for 30 feet and a shaft 18 feet in depth, showing ore throughout.

On the *Christian* a 20-foot tunnel has been driven.

On the *White Cap Group*, situated on Boulder creek and comprising four claims, development consists of a 65-foot tunnel showing 2 feet of clean ore all the way. The formation is quartzite and slate, the ledge averaging 4 feet in width.

The *Pretty Girl Group*, situated on Boulder creek, on which property considerable development had been done, has now been leased and work is again under way. A tunnel has been driven tapping the lead at 325 feet in and giving a depth of 200 feet, while a shaft of 70 feet has been sunk and another tunnel run for 45 feet.

The *Silver Queen Group*, situated on Law creek, consists of three claims in a formation of limestone, slate and porphyry. The ledge is 5½ feet in width. Samples assay about 69 ounces in silver and 59 per cent. lead. The development work consists of No. 1 tunnel, 70 feet; No. 2 tunnel, 30 feet, and No. 3 tunnel, 30 feet, all driven on the lead, besides numerous open cuts, showing up 2½ feet of clean ore. There are several car-loads of ore on the dump awaiting shipment.

The *Tecumseh Group* is situated on McDonald creek and consists of three claims. The ledge averages about 6 feet in width and is well mineralised throughout. The ore is galena, carrying good silver and gold values. Development consists of No. 1 tunnel, 25 feet, and No 2 tunnel, 25 feet, both on the lead and showing about 20 inches of solid ore, 15 tons of which will be rawhided for a trial shipment this winter.

Ptarmigan Mine.

This property, formerly known as the *Red Line Group*, is situated on Macdonald and Red Line creeks, tributaries of Horse Thief creek. The development work consists of:—Total footage in drifting, 2,646 feet; total footage in winzes, 148 feet; total footage in raises, 234 feet; total, 3,028 feet. A Bleichert tramway has been installed and is now in operation; it is 7,550 feet in length, and has a capacity of 200 tons per day. During the year a 4-drill Riedler straight line express air compressor has also been installed; it is run by steam power, supplied by a 96-h.p. Babcock and Wilcox return tubular boiler. There is besides a portable saw-mill with a capacity of 5,000 feet B. M. per day, and a blacksmith shop, 2 bunk-houses with a capacity for 75 men, general offices, compressor building, saw-mill shed, assay office, 2 tram terminals and stables have been erected. The mine is also connected by telephone with Wilmer, a distance of 28 miles along a good waggon road. Development is steadily proceeding and a large body of ore, 22 feet wide, has been uncovered; this will, in the near future, be treated on the ground, only 60 or 70 tons of high grade ore having been shipped this summer (1903).

The *Paystone Group*, situate on Horse Thief creek, consists of four claims in a quartzite and slate formation. Development consists of, on the *Paystone*, a tunnel 30 feet and shaft 25 feet, and on the *Copper Vault*, a tunnel of 48 feet, showing a good body of ore assaying 12 % copper, 5 ounces in silver and $4 in gold per ton.

The *Imperial* and *Empire* are situated about 6½ miles from where the waggon road ends on Horse Thief creek at the junction of Macdonald creek. There are two distinct ledges running through both claims, one a quartz lead 15 feet wide, carrying bunches of grey copper and coarse cube galena, from which assays have been obtained high in gold and silver, with 60 % lead, while the other ledge is 4½ feet wide with 10 inches of solid ore. The two leads are about 30 feet apart. Development work consists of numerous open cuts and stripping.

VIEW DOWN BASIN, PARADISE MINE—WINDERMERE, N. E. KOOTENAY.

On the *Juneau Group*, situated in the vicinity of the *Imperial*, only assessment work has been done so far, but with promising results.

No. 3 Creek Camp.

This camp is situated on No. 3 creek, and is distant about 21 miles from the Columbia river *via* No. 3 creek or Steamboat Mountain valley, but at present is reached from Wilmer, a distance of about 27 miles, 6 by waggon road and 21 by trail *via* the Hurst ranch. The principal claims in the vicinity are the *Lead Queen Group*, *Steele Group*, *McLean Group* and *Isaac Group.*

The *Lead Queen Group* consists of five claims on the same lead, running from No. 3 creek bottom to the headwaters of B.D.S. creek. The locations lie in a quartzite, slate and schist formation, the ledge averaging about 10 feet in width. Development on the *Lead Queen* consists of a cross-cut tunnel 264 feet long, tapping the vein at a depth of about 120 feet, a drift on the lead showing 2½ feet of clean ore and 6 inches of talc all the way, an open cut 25 by 20 in ore and 150 feet of stripping, showing ore all the way.

On the *First Effort* a tunnel 125 feet long has been run, tapping the main lead and paystreak. A good rawhide trail has been built from the creek bottom to the headwaters of B. D. S. creek. The latest samples assayed gave 75 ounces in silver and 64 % lead.

Steele Group.

This group is situated on Williamson and B. D. S. creeks, small tributaries of No. 3 creek, and consists of two claims located on the *Lead Queen Group* lead, which consists of quartzite, slate and schist about 10 feet in width. Development comprises 1 cross-cut tunnel of 50 feet, tapping the lead at a depth of about 50 feet; drift 25 feet, showing 2½ feet of solid ore and 6 inches of talc all the way and lead stripped for 250 feet, showing ore. Assays of 65 to 70 ounces in silver and 65 % lead are obtained. This property can be worked from either Williamson or B. D. S. creek.

There are numerous claims throughout this division upon which a good deal of work has been done, a large number being Crown-granted, but as no development has been performed on them lately, no mention is made of them herein, as they have already been referred to in previous reports.

Office Statistics—Windermere Mining Division.

	1902.	1903.
Free miners' certificates	107	103
Mineral claims recorded	89	77
Applications for placer leases	1	2
Certificates of work	210	129
Conveyances	68	20
Crown grants	12	8

GOLDEN MINING DIVISION.

Report of J. E. Griffith, Gold Commissioner.

The amount of prospecting has decreased considerably, as compared with previous years, but the number of assessments recorded has increased slightly and more actual development work has been done, notably on the *Good Luck Group* and the *Bennison Group.* It is to be hoped that, with the revival of actual mining, capitalists may be again induced to thoroughly test the large numbers of very promising claims throughout the division.

Good Luck Group.

This group is situated on the south fork of Canyon and Maclean creeks and is the property of The Labourers' Co-operative Gold, Silver and Copper Mining Co., Ltd. It comprises eight claims, the *Tough Nut*, *Good Luck*, *Cinnamon*, *Copper Cliff*, *Big Four*, *Big Goat*, *High Eagle* and *High Hawk*. Development consists of about 1,500 feet of drifts, cross-cuts and shafts. Three shifts are employed continuously. The present work shows veins from 3 to 15 feet wide, with 18 inches of copper ore with values from $4 to $8 in gold. About 100 tons of ore were packed down for a trial test, which was made in the company's own smelter at Golden a few days ago, but no analysis of the matte or slag is to hand as yet. The smelter is erected on Hospital creek, the furnace being a standard type of rectangular copper-matting furnace, 38 by 78 inches, with a daily capacity of 65 tons. The main or lower steel plate water-jackets extend down and rest on the cast-iron base plate, thereby forming a rigid base for same. The auxiliary or top-jackets are supported by a steel (I) beam frame resting on the corner columns. The furnace is water-jacketed from the hearth up to within a few inches of the feed floor. The top work is constructed of steel plate and brick. The blower, sampler, crusher and hydraulic elevator are all operated by water-power, which is generated by water taken out of Hospital creek, about two miles above the smelter, and conveyed in ditches and flumes to the hill opposite the latter. At this point a penstock is located and the water is brought from here to the smelter in 16-inch steel pipes; this gives a head of some 250 feet. The company also owns a large deposit of limestone about half a mile distant and is contemplating the erection of a tramway and electric drills at the mine next summer.

The *Bennison Group* is situated at the head of the middle fork of the Spillimacheen river. This promising property has been idle for some time, but a new company has now taken hold of it and is working from the middle fork side of the divide. A contract has been let for a 700-foot tunnel, which is at present well under way.

There are some very promising copper claims on Warren creek, but they have hitherto been hard to get at, as there was no trail. Now that there is some lumbering being done in this neighbourhood, there will be a waggon road practically the whole way to the creek.

OFFICE STATISTICS—GOLDEN MINING DIVISION.

	1902.	1903.
Free miners' certificates	153	141
Company "	7	5
Special "	1	1
Mineral claims recorded	144	64
Certificates of work	87	96
Payments in lieu of work	3	6
Conveyances	32	16
Placer leases in force	4	4
Affidavits filed	242	175

NORTH-WEST KOOTENAY DISTRICT.*

REPORT BY FRED. FRASER, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report of the progress of the mining industry in the Revelstoke, Illecillewaet, *Lardeau and *Trout Lake Mining Divisions, for the year ending December 31st, 1903.

In the Revelstoke Division no discoveries of importance have been made since my last report, but development work has been steadily prosecuted, apparently with sufficient results to justify three or four local syndicates being formed for the purpose of more extensively opening up a number of metalliferous properties in the Big Bend District. Placer leases have also been worked steadily, particularly on McCulloch and French creeks.

In the Illecillewaet Division the *George Group* made a trial shipment, with very encouraging results. The *Waverly* and *Lanark* claims have changed hands, and it may be that further work will prove these properties good investments.

The Lardeau Division is fast coming to the front and is proving to be rich in mineral; Fish River camp at the present time is emerging from the prospecting stage to that of a recognised producer. The Calumet and B. C. Mines, the Great Northern Mines and the North-Western Development Syndicate have been and are still working their properties, with encouraging results to their shareholders; the first two companies are running their stamp-mills steadily, and are reported to be doing exceedingly well.

Lexington mountain, on which the *Oyster-Criterion* and *Eva Groups* are situated, appears to be about the centre of the present gold belt, which apparently extends south-east to the *Beatrice Group* and north-west to the *Nelson Group*, covering a distance of ten miles. For the whole of this distance free-gold is found along the strike of the veins at various points. Assuming the gold belt to be of the length mentioned, and the working mines at its centre, we have, on the south-east, gold exposures on the *Lucky Jack*, *Gold Bug*, *Mohawk*, *Homestake*, *Gilman*, *Silver Crown*, *Silver Dollar*, *Beatrice* and other groups of claims. On the north-west, we have the *Stockholm*, *Lobster*, *Kingston*, *Copper Dollar*, *McMinville*, *Canada*, *Gold Finch*, *Independence*, *Nelson* and other groups, on none of which, however, excepting the *Beatrice* and *Gold Finch*, is there any practical work done, and the development on these is limited.

However, the *Eva* and *Oyster-Criterion* properties, when taken over by their respective companies, had no better showings or more work done than have some of the properties under consideration. They possessed strong ledges outcropping at the surface, with values that were sufficient to induce capital to test them by development, and this work is yielding good returns to-day. Knowing the results brought about by development in the working mines, it is to be expected that like development on the properties mentioned will be met with similar results, as the same conditions exist and the same veins pass through the properties, with equally good surface showings.

Last summer's work north and south of Lexington mountain, as well as prospecting work done on the mountain, shows a decided progress made in the finding of larger ore bodies and a better grade of free-milling rock. The Trout Lake Mining Division, owing to the recent discovery of free-milling gold at Poplar creek, has been brought prominently before the public during the past summer.

See also Report of Provincial Mineralogist on the Trout Lake and Lardeau Divisions, pp. 109 & 127.

REVELSTOKE MINING DIVISION.

REPORT OF W. E. McLAUCHLIN, MINING RECORDER.

I have the honour to submit my annual report of mining operations in the Revelstoke Mining Division for the year ending December 31st, 1903.

Quartz mining consisted principally of assessment work, and some promising discoveries have been made in the Big Bend district, while in placer mining the year 1903 witnessed substantial advances.

The Duquesne Mining Company, operating on Smith and French creeks, kept a large force of men working all the year, with satisfactory results.

McCulloch Creek.

The Revelstoke and McCulloch Creek Hydraulic Mining Co., Ltd., has expended about $16,000 this season in installing a hydraulic plant and a small saw-mill, with which to cut its own lumber, and it is now in a position to begin washing next season. The plant includes 140 feet of flume from the creek to the penstock, and a penstock which feeds the pipe line, which latter has an intake of 20 inches at the head, and reduces down to 11 inches where it enters the monitor. The pipeline, which is 1,240 feet long to the giant, is all double-rivetted steel pipe. There are two heavy water gates at or near the deflection of the pipe. The giant is a No. 3 double-jointed. The head, from penstock to giant, is 275 feet, and to the mill 315 feet. In addition, there has been put in a large, new, bedrock flume, some 250 feet long, with block riffles for 100 feet and long riffles for the balance of the distance. Three new houses have been put up, besides kitchen and dining-room, bunk-house, with sitting-room, office and store-room.

Camp Creek.

Messrs. Woodrow and Wells *et al.* have six placer claims, situate on Camp creek and have completed four miles of water-ditching from 3 to 14 feet deep. This will give sufficient water to commence operations in the spring.

MINERAL CLAIMS.

Downie Creek.

Messrs. Woodrow and Wells have also seven mineral claims, which are situate on the north side of Downie creek. Outside of these there are 20 other claims located, and these properties are all undeveloped, owing to the want of a trail, necessitating the packing of supplies. There is a trail partly completed for about eight miles up Downie creek, and it would require about $1,500 to finish this and extend it up the mountain to the properties mentioned. The owners would be willing to help, in conjunction with the Government, to complete this work.

The *George Group* consists of three claims, *George*, *Reggie* and *Alto*, located in September, 1896. They are situated on the North Fork of the Illecillewaet, in the Illecillewaet Mining Division.

There has been considerable work done on these properties, consisting of tunnel and shaft and stripping the vein, showing the lead to be well defined throughout the entire length of the three claims, and lying between lime and schist. The character of ore is a grey copper and galena, and picked samples run as high as $800 in silver, gold and copper. In August last five and a half tons were shipped to the Trail smelter as a test, and gave returns of $110 per ton. Also a test of two and a half tons was sent in November to Tacoma, through Pellew-Harvey, Bryant & Gilman, assayers, of Vancouver, and gave returns of $116 per ton in all values. It is the intention of the owners, Messrs. Woolsey, McCarter and Kilpatrick, to continue development work early in the spring.

OFFICE STATISTICS—REVELSTOKE MINING DIVISION.

Free miners' certificates issued	161
Mineral claims recorded	45
Placer claims recorded	12
Certificates of work issued	90
Money paid in lieu of assessment work	6
Certificates of improvements recorded	8
Bills of sale recorded	15
Mining leases issued	7

ILLECILLEWAET MINING DIVISION.

The Illecillewaet Division has, at present, no mining recorder, the office statistics being included in the Revelstoke Division. There is little to report from this section. The results of a trial shipment from the *George Group* proved encouraging, and it is hoped that further work will be accomplished. The *Waverly* and *Lanark* claims have changed hands and further development is expected.

TROUT LAKE MINING DIVISION.

REPORT OF PROVINCIAL MINERALOGIST.

Trout Lake Mining Division comprises the drainage area of the Lardeau river, above and including the drainage area of Poplar creek. The Mining Recording Office of the Division is at the town of Trout Lake, at the head of the lake of the same name, and is situated very nearly in the centre of the division and also at about the centre of its greatest mining activity.

Within the past year the discovery of some very rich gold quartz in the neighbourhood of Poplar creek, in the southern end of the district, has caused a good deal of mining excitement and prospecting in that section, and to meet the convenience of the prospectors and facilitate the recording of their claims, a Deputy Mining Recorder's office, a branch of the main office at Trout Lake, was established at Poplar. This has done a large amount of work and has been a great convenience.

Formerly, the only route into the centre of the Division, the vicinity of Trout lake, was from Arrowhead, at the head of Arrow lake, and thence by a small steamer to Beaton (Thomson's Landing), from which point a stage road, some 18 miles in length, leads to the towns of Trout Lake and Ferguson.

Within the past two years a line of railway, a branch of the Canadian Pacific Railway, has been put in operation from the town of Lardo, at the head of Kootenay lake, following up the valley of the Lardeau river to Gerrard, at the south end of Trout lake, from which point a steamer runs to the town of Trout Lake, situated at the north end of the lake.

From Trout Lake to Ferguson is a distance of about 4 miles by a fairly good waggon road. Both of these towns have good hotel accommodation, general stores, a post office and are connected with Arrowhead by telephone. During the past summer a daily service, consisting of a freight or passenger train one way, has been maintained on the railway, with a boat daily, or oftener if required, on Trout lake, while between Lardo and the other points on Kootenay lake connection has been maintained by the Canadian Pacific Railway Company's steamer three times a week. Communication and transportation facilities are thus now established between the heart of the Division and the various shipping points on Kootenay lake, giving direct connection with two main lines of railway.

This additional and vastly improved means of transportation into the district, passing, as it does, through a previously comparatively unexplored part of Trout Lake Division, has, by rendering this section more accessible, given a remarkable stimulus to mining within its limits, the effect being clearly evident in the increased number of prospects being developed and in the renewed activity shown by the working mines of the vicinity.

The valley of the Lardeau river, including its drainage area to the east and west, has more particularly received close attention from the prospector, great encouragement having been given to prospecting by the finding near Poplar creek of some exceptionally rich quartz, with the result, it is reported, that some 700 mineral claims have been staked between Poplar creek and the south end of Trout lake.

In the vicinity of Trout lake the mines have been worked for some years under the handicap of excessively heavy costs for transportation, both for supplies coming in and for ore going out, which costs, although not exorbitant under the then existing conditions, were so high as only to permit of "bonanza" ore being mined, and prevented the serious development of certain low grade deposits long known to exist. Under the improved conditions of transportation, attention has been given to the low grade propositions and to certain lower grade ores known to be associated with the high grade, but which it had not previously been possible to extract, and which gave little encouragement even to develop.

Several of these properties have been equipped with aerial tramways, mills and mining machinery, which should admit of much ore being mined that previously could not be, and which had not even received that development by which only can such an extent of ore deposit be demonstrated, or such as would justify the expenditure of the large sums of money which are necessary for the installation of plants to treat a large tonnage of low grade ore.

Although for this Report only those properties in an advanced state of development were examined, there are a number of other claims in the district on which has been done, quietly and unostentatiously, a comparatively large amount of work in practically trying to demonstrate the extent and continuity of surface indications which gave good promise. As to the results obtained from these prospecting developments, it is as yet too early to speak individually, or further than to say that probably within the near future there will be several new properties added to the list of producing mines.

The topography of the Trout Lake Mining Division may be thus summarily described:—

A long, low-lying depression, trending north-west and south-east, traverses the division lengthwise through its centre, and is occupied in part by the Lardeau river and Trout lake, having a gradual slope as indicated by the flow of the river. From Trout lake the depression continues north-westerly to the northern boundary of the Division, a low pass with an almost imperceptible summit, and thence continues in the same direction into the Lardeau Mining Division, towards the valley of Fish river. From this depression the mountains rise on either side, on the east to the divide separating it from the valley of the Duncan river, and on the west to the divide separating it from the drainage area of the Arrow lakes. The hills to the east are rugged, cut by deep ravines and towards the summits precipitous, the range having an elevation of from 8,000 to 9,000 feet, while individual peaks reach 11,000 feet. To the west the mountains are not so rugged, and rise more gradually to a height of from 6,000 to 8,000 feet above sea level.

The average width of the Lardeau drainage area is not more than 25 miles from summit to summit, which argues swift and torrential tributaries flowing in from either side, of which there are a large number, their sources being usually in some small basin, nestled among the peaks and surrounded by glaciers or snow, which lasts well through the summer, thus keeping up a constant water supply and affording innumerable small water powers. In this narrow drainage area, with a railway or boat service through its centre, no point is very distant in miles from transportation facilities; but though the distance "as the crow flies" may be short, the rugged nature of the country and the elevation required to be gained usually necessitate a very circuitous route to be adopted for a trail, although should it in any instance become necessary to transport ore to the railway, a very direct and comparatively short route may be selected for an aerial tramway, a mode of transportation peculiarly adapted to a country of such character.

The low-lying lands are, as a rule, densely wooded with large timber, which continues, with trees of decreasing size, to the timber line, here at an elevation of approximately 7,000 feet. The undergrowth is usually dense and difficult to penetrate, while moss covers the ground and renders prospecting difficult if not impossible, save where some bluff of rock shows up. Travel with pack animals is also difficult, except over certain defined and built trails, and feed for horses is lacking except above timber line in certain basins near the summits. All of these conditions contrive to render the difficulties of prospecting the district very great, and have undoubtedly greatly retarded its development.

A geological examination is similarly rendered difficult, and very little reliable data is available, save that obtainable from the bare summits and from certain isolated spots exposed naturally, or uncovered in the development of the various prospects. From such data it would appear that the central depression of the district is chiefly, if not entirely, occupied by slates, shales, magnesian and chloritic schists, all more or less disturbed and altered, yet preserving a general N. W. and S. E. strike with the trend of the valley.

To the east of the valley the same class of sedimentary deposits, with the addition of certain beds of limestone and calcareous shales, extends over the summits into the Duncan river valley, and thus forms the rock matter of the intervening range of mountains. In this section a few dykes of igneous origin, felsitic in character, were noted, but as far as the comparatively limited field of observation showed, did not appear to have been of such frequency or importance as to have been the cause of the observed mineralization, although it is quite possible that such igneous masses may underlie the surface deposits more generally than the surface itself indicates. In the low-lying valley no rocks of igneous origin were observed. On the slope to the west of the Lardeau river, as far as was observed, these same altered sedimentaries continued, but no igneous intrusions or float from such were seen.

In the vicinity of certain quartz ledges, the schists had been much altered by siliceous waters, and secondary crystals of iron, garnet, &c., had been formed, which locally gave the rocks a porphyritic appearance, but upon tracing them for a short distance they were found to gradually blend into the ordinary schists and shales of the district.

The upper portion of this slope was not visited, but from information obtained from prospectors working therein and from others, as well as from samples of rocks said to be obtained therefrom, it would appear that the upper portion of it, probably including the summit, is to a large extent composed of rocks of igneous origin, such as granites, gneisses, &c., which are probably of more recent origin than the sedimentaries, and it is likely that their upheaval is probably largely responsible for the tilting of the measures observed and for the alterations noted at a considerable distance from the actual outcropping of such igneous rocks. Along this outcrop mineral veins carrying good values have been already located, and it is probable that such contact will in the future prove a fruitful field for the prospector.

The slates, shales and schists here noted resemble in many respects the formation seen in the Fish River District, and it is highly probable that these two formations will be proved to be continuous, although the data for such assertion is still lacking.

In both of these districts the formation is cut by innumerable fissure quartz veins, varying in size from mere stringers to veins of 6, 8 or even 10 feet in average width. So numerous are these veins that, in certain parts, they form a distinct feature in the visible formation. Of these fissures there are two distinct series or systems; first, an interbedded series running with the formation, and, second, a cross-line system cutting the formation and the veins of the first system approximately at right angles. The veins of the first system are the larger, appearing as a rule to be quite persistent; they can be traced for some distance in the Poplar Creek District, where most work has been done on them, while in other exposures at higher elevations they seem to taper off to nothing, to be replaced or renewed in another strata of the schists or shale, as is the usual habit of veins in such formations, where they are in reality elongated lenses of quartz.

The second or cross systems of veins has the appearance of being of later origin, although no definite proof of this was obtainable, and the leads are on the average narrower, though showing less variance in width than the first series; their breadth might be approximately stated as running from 1 to 6 feet.

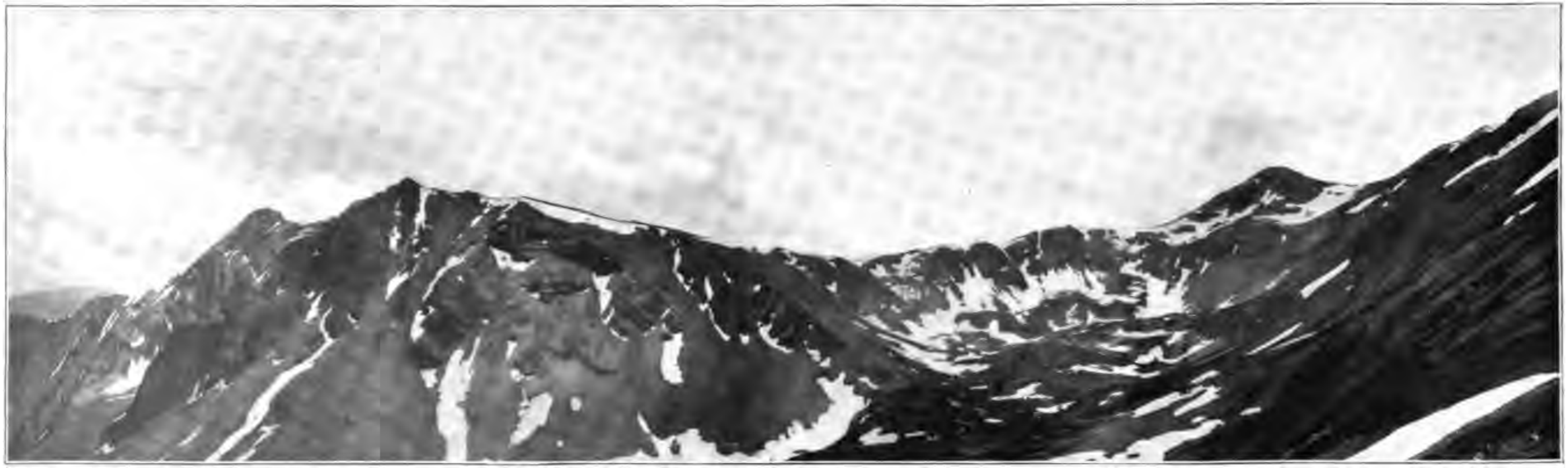
POPLAR CREEK DISTRICT.

In June of this past year (1903) considerable excitement was caused by the finding of rich gold quartz near Poplar creek and adjacent to the railway, information of which reaching the public caused a great influx of prospectors and others into the district, with the result that during the past summer this part of the Trout Lake Division received much general prospecting and more claims were staked in this vicinity than in the whole of the remainder of the Division. This district has, for the past few years, or since the beginning of the construction of the railway, been prospected more or less, and it had been known that mineral locations had been staked there which gave great encouragement for future development.

Three years ago John Winquist located a group of claims on Poplar creek, from which some exceedingly high assays were obtained in silver and gold. In the Report for 1902 mention was made of a find of rich gold-bearing quartz on Rapid creek, at the *North Star* claim, located in 1901, and a similar find was recorded as being made on the *Maggie May Group* on Tenderfoot creek. Marquis & Gilbert also located gold-bearing quartz on Poplar creek in 1901. This section may, therefore, be said to have been known to have mineral locations from which high assays had been obtained. At the present time the public attention has become centred at Poplar creek in the *Lucky Jack* and *Swede Groups* and in Marquis & Gilbert's claims, although a number of other properties are being quietly developed which have good veins and good prospects.

Spyglass Group. This group, owned by John Winquist *et al.*, was not personally examined by the writer, as, at the time of his visit to the district, a section of the trail on the steep side-hill had been washed away and so rendered travel temporarily impossible, but the following description was obtained from a reliable source:—

The property is situated about 12 miles up Poplar creek from the railway, well into the granite belt already described and at an elevation of about 7,000 feet above the sea, or 5,000 feet above the level of the valley. The lead is described as occurring at or near a point where the granite is cut by a large dyke some 20 feet wide. The lead is partially in this dyke matter and is from 18 inches to 20 inches wide, consisting of quartz carrying galena, gray



LOOKING UP PARADISE BASIN, WINDERMERE MINING DIVISION, SHOWING FOLDING OF STRATA.

copper, etc., together with native silver, of which latter some beautiful specimens were obtained. On the lead a tunnel of 30 feet has been driven and a considerable further amount of prospecting work has been done elsewhere on the claims. No ore had been shipped, but it was understood that a few tons of that taken from the tunnel would be sent out this fall as soon as the trail was in condition. Assays running as high as desired can be obtained from various samples, being reported up to 3,000 to 4,000 ozs. in silver, but with ore of this character its average value will only be definitely known when shipments in bulk have been made.

The recent "finds" of rich gold quartz have been near the river and all within the schist belt already described. The formation here is everywhere cut by quartz veins such as described, which occur on almost all of the claims staked, and from most of these veins gold may be obtained in the pan in greater or less quantity. In some places the gold is plainly visible in the quartz, while again it is not visible to the eye until crushed and panned; and yet again it is found in association with a heavy sulphide, which is evidently the gold-carrying medium.

Marquis & Gilbert Group.

This group, owned by Marquis & Gilbert, consists of three claims, the *Ophir*, *Ochre* and *Gold Park*, and is situated on the north side of Poplar creek, about one and a half miles by trail from the Lardeau river and from the railway, at an elevation of about 2,600 feet above sea level, or about 600 to 700 feet above the valley. The *Ophir* and *Ochre* were the first claims located, while the *Gold Park*, staked later, is situated on the side of the previous claims. The claims are all in the schist belt already mentioned and include a number of outcrops of quartz veins. On the *Ophir* and *Ochre* claims a number of open cuts and surface strippings have exposed two or three quartz veins, which apparently follow the laminations of the enclosing chloritic schist. These veins are not very definitely defined, but are made up of a number of smaller adjacent veins, with occasional schist partings, and may perhaps be best described as exceedingly silicious zones in the schist, the quartz sometimes predominating to such an extent as to form what appears to be one vein, having a width of from 10 to 15 feet. These zones would seem to be fairly continuous and regular and are supposed to be the main leads of the locality. With this quartz are associated certain secondary minerals, forming the lead, and through this lead, scattered in flakes or bunched in considerable masses, there is a considerable percentage of arsenical and iron pyrites, together with a smaller amount of galena. On the surface these sulphides are more or less oxidised and gold can be obtained almost anywhere in the pan. The gold is partly "free" in the quartz, but the values, for the greater part, are in the sulphides, which assay well in gold. The future of the claims depends upon the quantity of such sulphides that may be developed in the working of the property, and owing to the "bunchy" character of the deposit, this will only be determinable after more extensive development has been done. While high assays can be obtained by picking the sample, the owners report the values obtained on legitimate average samples to be about $8.60 per ton.

The *Gold Park* lies lower down the hill, and on this claim a shaft has been sunk for about 25 feet, following down a small quartz vein which lies along a "slip" in the formation and against a very much weathered dyke, or a very "irony" band in the schist; this band was about 10 feet wide and ran with the formation and the vein, having a strike of about S. 55° E. (Mag.). As far as it had been sunk, the shaft carried the quartz, together with a considerable amount of iron oxide, all rather soft but enclosed in walls of the schist. From the bottom of the shaft a cross-cut drift was being driven through the "dyke." From the shaft the vein had been traced for some distance by means of open cuts. Other and parallel veins are indicated on the property, but have not been developed to any extent. The material from the shafts and open cuts will give good gold on panning, and occasionally free gold is visible. A few tons of this ore was being sacked and a small trial lot will be shipped this fall or winter. In the oxidised material on the dump there were a number of pieces of galena; this mineral is, however, not in sufficient quantity to account for the values found, which are chiefly in gold. While gold is occasionally visible in the quartz, the greater proportion of such value is seen, upon panning, to be in the oxidised material, which is probably the result of oxidisation of arsenical and iron pyrites.

It was from this claim that the samples of gold were taken, in June, 1903, which caused an unusual amount of interest to be displayed in this district, and there is no doubt but that very high assays can be obtained from samples derived from here. The owners took pains to distinctly disavow responsibilities for the statements of fabulous assays attributed to them, or for a report that they had discovered platinum on the claim. The development work so far done demonstrates that on these claims there are a number of quartz leads of fair size and of reasonable continuity, that gold can be panned from almost all of such exposures, and that assays in gold of from $6 to $12 can be expected from large samples. A cabin has been built upon the property and work was to be continued this winter.

These properties are all that the owners claim for them, namely, a group of prospects upon which only about one season's work by two men has been done, but such work has at least indicated that there are a number of fairly regular and persistent quartz veins, that such exposures as have been made show gold in the pan, and that assays obtained from the work done indicate values in gold sufficiently high to admit of the ground being worked and to well justify further development. The claims are being legitimately, carefully and intelligently developed by the individual work of the owners, two prospectors, who believe their property worth trying to develop into a mine, and their belief seems justified by the work done.

The Great Northern Mines, Ltd.

This company holds the *Lucky Jack* and *Swede Groups* of claims on Poplar creek, from which were taken the extremely rich gold samples which caused so much excitement during the summer of 1903. The company is a new corporation and is a consolidation of several mining enterprises in one organization. According to a prospectus issued in September last, it is a consolidation of the *Lucky Jack* and *Swede Groups* on Poplar creek, the *Oyster-Criterion* and *Imperial Groups* on Fish river, the *Lade Group* on Gainer creek, and the *Strathcona Group* on Silver Cup mountain, some 21 claims in all. The capital of the company is $1,500,000, in shares of $1.

Directors.

W. B. Pool (Managing Director), Ferguson, B. C.

T. Kilpatrick, C. P. R., Revelstoke, B. C.,
W. F. Cochrane, McLeod, Alberta,
E. M. Morgan, Poplar, B. C.,
F. W. Godsal, Cowley, Alberta,

Jas. Lade, Camborne, B. C.,
J. J. Young, Calgary, Alberta,
B. Crilly, Ferguson, B. C.,
Robert Hodge (Secretary), Ferguson, B. C.

Of the groups of claims held by this Company, the *Oyster-Criterion* and *Imperial* are in the Lardeau Mining Division and are noted thereunder. The *Lade* and *Strathcona Groups* are in the Trout Lake Mining Division; the former is reported as Crown-granted, but on neither was work being carried on at the time the properties were visited.

Lucky Jack Group.

This group consists of the *Lucky Jack*, *Little Phil* and *Lucky Three* mineral claims, and is situated just south of Poplar creek. The group has been surveyed preparatory to Crown-granting. The claims adjoin and extend from the railway track, about one-quarter of a mile below Poplar creek, directly up the hillside in a direction nearly parallel to the creek. The property is under the local management of Mr. E. M. Morgan. The group lies in the schist belt already mentioned, and outcropping on the claims are a number of quartz veins, the management claiming in all some ten separate leads. These veins are believed to belong to the cross vein system previously mentioned and are practically parallel. The outcrops here are particularly noticeable, as they sometimes stick up above the surface for several feet, having apparently withstood the weathering bettor than the enclosing rocks.

This group was brought very prominently before the public this past summer, owing to the finding of some exceptionally rich quartz in one of the veins outcropping on the property, and such development work as has been done on the group has been practically confined to the vicinity of this vein and outcrop. The vein on which the rich showing was found outcrops in a small ridge or foot-hill rising from the flat valley for 70 to 80 feet high; back of this lies a sag or draw running parallel to the range of hills, and above this sag the hill rises by a series of steps or benches.

As far as could be judged from the surface, a certain amount of step faulting had taken place, and the probability is that the two lower foot-hills, by such faulting, have been moved down from the main mountain, which supposition is borne out by the "broken" condition of the formation and the "blocky" character of the masses of rock. The veins in question had been found "sticking up" out of this first foot-hill for 10 to 15 feet, while from certain lower fragmentary masses found in the alluvium on the hillside and under the exposure, it was apparent that more of the ledge had been exposed and had broken off. From this exposure and from the float lying adjacent to the ledge, there had been taken some wonderfully rich specimens of gold quartz, in which in some cases the gold outweighed the quartz.

In September, when the claim was visited, some sacks of exceedingly rich samples were in the superintendent's cabin, and it was explained that all the coarse gold visible in the ledge had been broken out by hammer "to prevent its being stolen," and that for this reason no further rich gold showings were visible in place in the ledge. In the samples seen in the cabin and elsewhere, the gold was chiefly free in the quartz, in which condition it would be expected in the outcrop. Subsequent development has shown that associated with the free gold in the ledge is a certain amount of arsenical iron sulphide which runs high in gold, an assay of it made at the Government Assay Office giving $116 to the ton.

This vein is traceable, apparently continuous, in a number of exposures and open cuts for some distance up the hill, such faulting as may have occurred not having very seriously thrown the lead. The quartz is white, though stained along fissure lines by iron. The vein is from 2 to 4 feet wide, and has the appearance of permanency, though frozen to the country rock, into which the silicious matter seems to have permeated for some distance, leaving no very distinct line of demarcation between the vein and country rock; this is seen more particularly in the tunnel.

In order to strike the lead at a depth, a tunnel had been started about 20 feet above the flat and run in on the vein, and, at the time it was seen, was in about 80 feet. For this distance the formation was all broken, but the lead could be distinctly followed. It was estimated that the tunnel would have to be driven another 100 feet approximately in order to be under the very rich surface outcrop. The tunnel should give, when under such outcrop, a depth estimated at 50 feet, or about 30 feet in the "draw" back of the first hill. The quartz taken from this tunnel was lying on the dump and was carefully examined; it contained a percentage of arsenical iron pyrites with occasional visible flakes of gold, and would yield "colours" in the pan. No assay was made of this dump; in fact, the only satisfactory test possible would be a stamp mill test. No coarse gold, such as found on the surface, could be seen in the tunnel, and whether the exceedingly rich surface showing will extend to depth can only be determined when the tunnel reaches that point. Visible free gold has been found in other of the quartz veins exposed on the property, but the exceedingly rich specimens have all come from this one lead. On the property there had been erected of lumber a cook and a bunk-house, while the foundations were being laid for an office and superintendent's quarters. The trees were being cleared away in anticipation of putting up other buildings later, and for a stamp-mill, which the management hopes to erect in the spring.

The Swede Group.

Consists of *Goldsmith* and *Gold Hill* mineral claims, located by H. Magnusson and partners, and recently acquired by the Great North-Western Mines, Ltd. These claims adjoin the *Lucky Jack Group*, lying higher up the hillside; they are probably a continuation of the leads found in such group, and may be so regarded. The only work done on these claims consisted of a little stripping of the leads, from which surface workings samples were shown carrying free gold, practically as rich as from the *Lucky Jack*. No work was being done on this group in September, the development being concentrated on the lower group, and most of the strippings were reported as obliterated by heavy rains. It has subsequently been reported that other rich samples were obtained later from further surface workings.

SILVER CUP MINES, LIMITED.

The Silver Cup mine, well known as one of the most prominent in the Division, is now held and is being operated by an English company, The Silver Cup Mines, Ltd., of which the president or chairman is J. D. Walker, Esq., of London, and the secretary is Mr. E. G. Haddow, whose office is at Ferguson, B. C., as is also that of the general manager of the company, Mr. D. G. Forbes. This new company has taken over the *Silver Cup* and *Sunshine* mineral claims, formerly owned by the Sunshine Company, Ltd. Under the new ownership and management extensive development has been accomplished and important improvements, both in the method of and the means for handling the ore, have been inaugurated. An aerial tramway has been erected, a mill is now under construction and a number of other cost-saving improvements have been or are being installed, on all of which the work is being energetically pushed, and for which ample financial support seems available.

Silver Cup & Sunshine Mineral Claims.

These properties have twice previously been described in the Reports of this Department, so that now only a summary will be given. They are Crown-granted claims located on the South Fork of Lardeau creek, distant some 9 miles from the town of Trout Lake and 7 miles from Ferguson. From Ferguson a waggon road follows up the South Fork to "5-Mile," a distance of 2 or 3 miles, and from here the road leads to "8-Mile," where the old trail up to the mine began. At "5-Mile" the new company is now erecting a mill for the treatment of the low grade ores from this mine, and also from the *Nettie L.*, held by a separate company but under the same management.

Geology.

The general geological formations of the locality may be briefly described as consisting of graphitic and magnesian schists and shales, dipping at a steep angle to the N. E. and having a general N. W. and S. E. strike, all being approximately parallel with what is known locally as the "big lime dyke," which forms a succession of ridges or rocky prominences and constitutes one of the most easily traceable geological features of the district. Outcropping in the claims and running through them is what is known as the "small lime dyke," and which is found to be interbedded with the schists and shales of the district. This so-called "lime dyke" is much weathered on the surface and has been generally classed as of sedimentary origin. On this latter point, however, considerable doubt has been thrown by the underground workings, and while no microscopic examination of the rock matter has been made, it is believed to be an intrusive igneous dyke, containing much lime as a constituent and, as far as known, following the stratification of the country rock.

Following parallel to this smaller dyke, and within a few hundred feet of the same, there have been developed on these properties two distinct zones of mineralisation containing lines of lenses of ore. The first of these lines of lenses, known as the "Cup" lead, was located some 100 feet from the "small dyke," and on this lead the first shaft was sunk, on the *Silver Cup* claim. Subsequently, in driving a cross-cut tunnel to strike the "Cup" lead, at a depth of 130 feet vertical, a second series of lenses, called the "Big" lead, was cut through, some 45 to 50 feet to the S. W. of the "Cup" lead. This lead is "blind" on the surface, but undoubtedly continues to a considerable depth, as the workings prove. These lenses occur with more or less persistency in a line, interbedded in the schists, and more or less connected with stringers of quartz, sometimes so small as to be difficult to trace, but usually eventually leading to a further lens of ore. The lenses occur along the zone of mineralisation for 300 to 400 feet and have been worked for that distance. The first development of the property was conducted in the belief that the lenses in line constituted all that were to be found, but subsequent work has proved that, parallel with the main line of lenses and close to it, though not in line with it, are certain other lenses. This new development has added considerably to the possibilities of the properties.

In the past only shipping ore was sought or mined, and with the transportation facilities then available this ore had to be of high grade. Since a mill has been decided upon and tramways built, attention has been directed to mineralisation formerly neglected, with the result that it has been shown that between and surrounding the occasional lenses of high-grade ore there is considerable ore that will probably pay for milling. Enough of this low grade ore had been developed to satisfy the management that a mill was justified. The development work done, while it has not shown the ultimate limits of such low grade ore, has developed enough to probably permanently change the style of mining to one more suited to a low-grade proposition with occasional rich lenses.

The ore found in the lenses is a galena with gray copper, carrying a high percentage of silver, and with some zinc blende and occasionally iron pyrites. The galena, when free from gray copper, will assay about 30 to 40 ounces in silver, but when gray copper is present to any extent the assays run very high in silver, the general average of the ore as shipped being about 150 ounces per ton. The gold also found in the ore seems to be in association with the iron pyrites when galena is present, rather than with the galena.

The management reports the following classification of the ores as expected to be mined, and the assays obtained from repeated samplings :—

	Lead.	Silver.	Gold.	Zinc.	Copper.
1st grade ore.....	20 %	150 oz.	$10.00	12 to 15 %	1.5 %
2nd 〃 〃	4 〃	50 〃	8.00	20 〃	1.0 〃
3rd 〃 〃	3.5 〃	30 〃	3.50	4.8 〃	1.5 〃

The low percentage of lead in the second and third class ores, as compared with the other values contained, is very noticeable, and indicates that while the galena may be localized in the lenses, the copper, zinc and iron carrying gold and silver values, appear to be more freely distributed throughout the ore body, which fact renders possible the mode of concentration proposed.

Ore Shipped.

The history of the mine shows that from about 1896 to 1901 a total of some 1,286 tons of ore were shipped, which assayed on the average about 35 % lead, 150 ozs. in silver and some $4 in gold. In 1902, under the new management, and at least to a great extent derived from the newly discovered ore lenses, there was shipped about 966 tons of ore which assayed from $5 to $6 in gold, some 125 ozs. in silver and 22 % lead. In 1903 the shipments amounted to about 975 tons, stated to have run about $10 in gold, 170 ozs. in silver and 25 % lead. The total output from the mine of shipping ore to date amounts, therefore, to about 3,228 tons, roughly averaging $6 in gold and 150 ozs. in silver per ton, and 30 % lead. In the mining and sorting of this shipping ore, low grade ore dumps have been formed at the mine, consisting of second and third class ore, which has been calculated by the manager to amount to about 7,000 tons in all, and which it is proposed to treat in the mill now under construction.

Development.

The *Silver Cup* and *Sunshine* are adjoining claims, both lying on a steep hillside, the former being the higher up the hill. The "Cup" and "Big" leads are supposed to extend through each of the claims, the trend of them both being up the hillside, nearly at right angles to the line of the hill. This enables the leads to be easily reached at various elevations by adit tunnels, a method of development which has been adopted.

On the *Silver Cup* claim work was first started on an outcrop of the "Cup" lead, where a shaft was sunk for 175 feet on the lead, which here had a dip of about 65°. From this shaft, at the 50-foot level, drifts were run for a short distance on a chute of ore. Subsequently, a cross-cut adit tunnel was driven from a ravine to cut the lead at the depth of this shaft. It was in the driving of this cross-cut that the "Big" lead was encountered, lying parallel and some 50 feet to the south-west of the "Cup" lead and being "blind," that is, not extending to the surface. This tunnel, known as the "175-foot," or "Upper tunnel," is 350 feet long and at the level drifts have been made in both leads, on the "Cup" lead to the extent of about 300 feet, and on the "Big" lead of 375 feet. From these drifts, raises and stopes continue nearly to the surface.

In 1898 a second cross-cut tunnel, known as the McNeil cross-cut, was started from the same ravine, but 96 feet vertically lower than the Upper tunnel. This tunnel cut the "Big" lead at 234 feet in and was continued for 100 feet further to the dyke, the "Cup" lead not being found productive here. From this same tunnel a drift was run to the right for 620 feet on the "Big" lead. In driving this drift low grade ore was met with four or five times and was not rich enough then to mine, but now constitutes some of the reserve of ore of this class which will be sent to the mill. At 500 feet from the tunnel and directly under the upper workings, a body of rich ore was encountered, on the side of which a raise was made to the upper workings. Above this level most of the high grade ore as yet developed has been removed, although from 2 to 3 tons a day are still being mined from a stope. From the McNeil tunnel level a winze was being sunk on the "Big" lead and was, in November, 1903, down 71 feet, having carried good ore for most of that depth. When visited there was, in the bottom of this winze and on either side, from 18 to 24 inches of high grade argentiferous galena. No work had been done on the "Cup" lead on this claim below the McNeil tunnel level. It would appear from these workings that the known chute containing the lenses of rich ore is about 300 feet long. Little attention had been given previously to developing the low-grade ore bodies, and, consequently, these to-day remain unproven, although the management is satisfied that they will be shown to be of considerable extent.

Following the mineralised zone down the hillside from the shaft on the "Cup" lead, an outcropping of galena was found on the *Sunshine* claim, about 1,700 feet to the N. W. of such shaft, and at an elevation of about 297 feet lower than the McNeil tunnel. This ore was found at the contact between the dyke and the schist. At this point a tunnel had been run in for some 270 feet by the old company, developing two lenses of ore 10 and 25 feet long, respectively, and from these lenses some 70 tons of high-grade ore have been shipped. This, the old *Sunshine* tunnel, has not been driven any further by the new company, but a new tunnel, known as the New Sunshine tunnel, has been started 100 feet lower down the hill. This tunnel is now in about 1,000 feet, and it is calculated will have to be driven 700 feet further to bring it to the main ore chute developed in the *Silver Cup* workings. These two last-named tunnels are believed to be on the "Cup" lead. The ore bodies struck in the old Sunshine tunnel, or similar ones, were found in the new or lower tunnel about in place, but otherwise the tunnel is, as yet, in barren ground. The new tunnel is being driven 11 feet high and is designed to be the working tunnel for the whole property, as soon as connections are made with the upper workings. It is being driven by contract for $9 per foot, powder and air for an air-drill being supplied.

Plant at Mine.

The old log office, cook and bunk houses erected by the former company just below the McNeil tunnel were still in use in November, 1903, but in anticipation of the completion of the New Sunshine tunnel a commodious and very comfortable bunk-house, cook-house, office, etc., built of sawn lumber, were being constructed and were nearing completion. They are situated on a bench just above and a little to one side of the mouth of the tunnel referred to.

At this same point a small engine-house had been erected and contained a boiler and small air compressor, a temporary arrangement only, it being the expectation of the company to eventually install an electrically driven air-compressing plant.

Tramway.

From the mouth of the New Sunshine tunnel an aerial tramway has been constructed to the valley of the South Fork. The upper terminal is just sufficiently below the tunnel to admit of suitable bunkers, while the lower terminal is just across the Fork and on the waggon road, about 3½ miles from "5-mile." The tramway is of the standard "Riblet" type, 7,200 feet long, with a drop between the terminals of 2,600 feet. The cables are 1-inch and ⅞-inch in diameter respectively, and the buckets have a normal capacity of 1,000 lbs. The tram is operated by two men, one at each terminal, and is capable of taking a load up equal to 60% of the down load. The cost of the tramway completed was $20,000. At present the line is used for taking up mine supplies and construction timbers, as well as firewood for the compressor boiler, waste rock from the tunnel supplying the motive power. The plant is a most creditable piece of work and in splendid working order. Since the completion of this line, the determination to build, at "5-Mile," a mill to treat the ore from both the *Silver Cup* and *Nettie L.* mines, from which latter property a tram is under construction to the mill-site, has necessitated a supplemental tramway being added to the *Silver Cup* tramway. This supplemental line leaves the main line some 2,000 feet vertically and 6,000 feet horizontally below the upper terminal, and runs direct to the mill-site at 5-Mile, with a vertical drop of 1,100 feet in this branch. At the junction of the lines bins are to be provided, into which the ore from the main line will discharge, and from these bins it will be filled into the buckets of the supplemental line and by them delivered direct into the bins at the mill. This tramline was under construction in November and will be completed before spring, in ample time to deliver ore when the mill is ready to receive it.

The second and third class ore dumps accumulated in the development of the "Cup" working are now lying just below the mouth of the tunnels, and to convey them to the upper terminal of the aerial tramway a small and temporary tramway is contemplated. Whether this will be a surface tramway or an aerial had not been decided, but it is understood this question will be settled and the construction undertaken early in the coming spring. (An eight-bucket aerial gravity tram has since been constructed.)

The company has secured land at 5-Mile for a mill-site, and is now erecting there a mill for the treatment of the ores from the *Silver Cup* mine. It is also intended to treat here the ore from the *Nettie L.* mine, which, though under a separate company organisation, is directed by the same management and owned by practically the same people as own the *Silver Cup.* The site selected for the mill is a hillside, sloping down from the road to the South Fork at an angle of about 20°, admirably adapted for the laying out of the mill in benches or floors, as has been done. The subsoil is sand and gravel, providing a good material for foundations, and admitting of excavation at a low cost. The mill has been laid out in floors, arranged in steps, the ore being received at the highest point and gradually descending by gravity through the various processes.

The following is an approximate arrangement of the mill as designed:—

Bench.	Drop to next bench below.	Use to which put and appliances to be installed.
1st floor..........	13 feet 6 inches.....	Ore-receiving bins, 200 tons capacity. Crusher.
2nd 〃	6 〃	4 batteries of 5 stamps each ; weight of stamps, 1,000 lbs.
3rd 〃	5 〃	Sizers.
4th 〃	8 〃	6 Dodd buddles and modified Wilfleys.
5th 〃	7 〃	Vanners and Wilfleys.
6th 〃	5 〃	Drying floor.
7th 〃	11 〃	2 "Howell-White" roasting and chloridising furnaces.
8th 〃	14 〃 6 inches	Cooling floor.
9th 〃 to creek ..	....	10 pan amalgamators and 5 settlers.
Total drop	70 feet.	

As will be seen from the above, the plant is partly a concentrator and partly a chloridising plant. The exact process to be employed has not been formulated, and will doubtless be adjusted from the necessities of the case as they arise. The main mill building is 132 feet long by 68 feet wide, with an extension about 37 feet 6 inches by 40 feet wide, containing the stamps and bins, while below the main building is a lean-to extension 32 feet long by 109 feet wide. It is understood that the mill and the process of concentration adopted have been designed by Mr. Attwood, who is employed as consulting engineer. In November the excavation of benches and the erection of the masonry retaining walls below each had been completed, while the wooden framework of the buildings had been mostly put up and would be ready for roof in a short time. Much delay had been experienced in the construction, owing to the excessively wet season, the rain retarding out-door work and rendering excavation troublesome. The machinery was reported as all being on the ground, but not erected. The company had erected at 5-Mile a very complete saw-mill, and had there sawed all the lumber for the extensive construction work undertaken. Very comfortable bunk-houses, a dining-room and kitchen, and a number of cottages for the married men were completed, as was also an office, laboratory and house for the superintendent, although much remained to be done in the way of fitting up these various buildings. The plant is expected to be ready for starting in the early part of 1904.

GREAT WESTERN MINES, LIMITED.

This company is operating the *Nettie L. Group* and the *Ajax,* under the same management as the *Silver Cup* mines, and the arrangements are such that the ore from these properties will be treated at the latter company's mill at 5-Mile, to which point an aerial tramway is being constructed. These properties were described in the Report of 1900, and, although considerable development has been done since that time, the main features remain unchanged.

The *Nettie L.* claim is on the hill overlooking the town of Ferguson. The waggon road from Ferguson to 5-Mile has been extended right up to the mine, and was found to be in very fair condition. The geological surroundings of this claim are very similar to those of the *Silver Cup.* The lead consists of a highly-mineralised zone in the schists, having a strike of N. 45° W. and a dip of 80°, as does the surrounding rock. The mineralisation is chiefly iron and zinc sulphides, with some galena and a little copper. On the surface these sulphides have been oxidised, and have formed an iron-cap of considerable extent. Parallel with the mineralised zone is a crushing, probably more recent, containing in the upper level much crushed and broken quartz ore-matter and iron oxide. It appears as if the minerals had been deposited in the schist by waters circulating along the line of fissuring. The schists are much silicified on and near the fissure plane, sometimes on one side and then on the other. The lead and copper sulphides seem to be the minerals carrying the values, which are chiefly in gold and silver, and, as averaged over the zone that would be mined, are not high, requiring some form of concentration before shipping. As already stated, in the upper levels there is a quantity of crushed matter and iron oxide. From this material very good assays in gold are obtainable, but it forms but a small percentage as compared with the general mass of the silicified and mineralised zone which constitutes the mine, and which is placed by the management as being 40 feet wide by 400 feet long, with a present development of 368 feet in depth.

In the Report of 1900 the existence of a cross fissure vein was noted in the right-hand drift off the 100-foot cross-cut tunnel, and this carried a very fair-sized chute of high-grade galena. In tracing and working out this galena vein it was found to extend, on the 100-foot level, from the fractured zone across the lead and to the surface at that level. This chute has been mined out down to the lowest level, 368 feet, and in this depth the course of the vein gradually swung around until it came to be parallel to the main lead, into which it is now dipping and merging. This subsidiary vein has yielded a considerable tonnage of galena, high-grade in silver, but since its practical absorption at depth by the main lead, the pure galena in this chute has diminished. At present, explorations are being made on this vein to try and locate a second chute of galena. Although no considerable chute is as yet definitely located, small stringers have been found and were being traced down with a fair probability of developing into such a second chute of galena.

In the main ore lead the values are "spotty," and it is very difficult to say what the average of the milling ore will be. The assays on the various samplings vary very much. The property is now regarded as essentially a concentrating proposition with a large body of low-grade ore, which the management expect to be able to treat at a profit in the new "Silver Cup" mill now under construction.

Development.

In addition to the tunnel mentioned as having been run in at the 100-foot level, a cross-cut tunnel, 560 feet long and 268 feet lower, had been put in from the other side of the hill, cutting the lead, on which drifts had been run and connections made with the upper workings in two places. An attempt to sink a winze below this lower tunnel had been frustrated by a heavy flow of water from a seam; this water appeared to come from below. The total amount of drifts, tunnels, etc., in the mine is about 6,000 feet.

Buildings, etc.

At the mine are ample and commodious bunk-houses, cook-house, and a foreman's office and rooms, while at a short distance down the hill, on the roadside, are several cabins for families. There is a small boiler and air compressor and one Baby drill was in use.

Aerial Tramway.

An aerial tramway was under construction by Riblet. The right of way was cleared and the terminal at the mine was being constructed below the mouth of the lower tunnel, from which point the tram line runs over the small hill, 350 feet above the upper tunnel, in which the mine is located, and extends to "5-Mile," a drop of 2,000 feet. The length of the line is given as 7,200 feet. This work, it is expected, will be completed and in running order early in the spring of 1904. The number of men employed in 1903 averaged about 35.

Triune.

The *Triune* mineral claim is situated on a small tributary of the South Fork of Lardeau creek and about a mile to the south-east of the *Silver Cup*, but in an adjoining basin. The property is at present held by the Metropolitan Gold and Silver Mining Co., of which Mr. J. McCrossan is manager, with office at Ferguson. The claim is reached from Ferguson by a waggon road to "8-Mile" on the South Fork road, from which point a sleigh road has been made up to the basin, at the head of which the property is situated. The workings are located in the high, steep ridge which forms the head of the basin and are at an altitude of from 8,200 to 8,500 feet above the sea, or about 5,600 feet higher than the town of Ferguson. The present cabin, situated part way up this trail, was in use during the past summer, but will be abandoned this winter, as it is liable to be taken away by snow-slides. The distance from Ferguson to the foot of the sleigh road is estimated at five miles. The sleigh road is about four miles long and has a regular grade, but is narrow and not at present suited for a waggon; it ends at the lower terminal of the aerial tramway, at timber line, from which point a trail almost two miles long rises by switchbacks up the side of and around the basin, for about 3,000 feet vertical, to the cabin and tunnel. A telephone line connects the cabin with Ferguson, and is a great convenience and protection when the snow comes and slides are frequent. The mine, from its situation at an elevation of 8,500 feet on a steep bluff and above timber line, has many serious, natural obstacles to overcome, which would have rendered a low-grade property unworkable, but the preliminary operations yielded ore of so high a grade as to admit of its being mined and shipped at a good profit. In 1903 the property shipped 113 tons of ore which yielded about $128 per ton, the values being chiefly gold and silver.

Development.

The bluff in which the mine is situated rises at this point at an angle of approximately 50°, rendering it nearly impossible to ascend without the aid of ropes, but enabling the ore body to be reached by short, cross-cut tunnels from the hillside. The upper outcrop of the deposit was found to be on the edge of and possibly underlying a permanent glacier. This outcrop was composed of a mass of decomposed matter, chiefly iron oxide and lead carbonates, carrying surprisingly high values in gold and silver. The outcrop was so situated as to be very difficult of access and the ore body was consequently attacked by tunnels.

The lower tunnel is approximately 215 feet lower than the outcrop and is 283 feet long, being rather winding in its course, but having a general direction of S. 75° E. (Mag). At 110 feet in, a cross-cut had been run off to the left for about 50 feet, and at 190 feet in from the tunnel mouth there is a raise nearly straight and following the dip of the ore body, which averages about 60°. This raise connects with the upper tunnel, about 105 feet higher up, and is continued to the outcrop some 106 feet above this tunnel. The upper tunnel is about 75 feet long from the surface to the point of intersection with the raise and is continued past the latter for some 40 feet as a drift. From the raise the following drifts have been run:—At 32 feet up, drift to left 15 feet, and to right 10 feet; at 98 feet up, drift to left 10 feet, and to right 25 feet; at upper tunnel drift to left 40 feet; at 118 feet and at 131 feet up, short drifts of 15 and 25 feet are off to the left, while on the right of the raise the ground has been stoped back for about 20 to 25 feet from the raise. Some 200 to 250 feet vertically lower down the hill a new tunnel is being run in and is intended to reach the ore body at that level. To enable this tunnel being started, a small bench had been cut in the hillside and on this a small bunk-house had been built against the side of the hill, designed in such a manner as to "shed" a snowslide, which at this point may be expected any time during the winter.

The ore body, as developed in the workings above the lower tunnel, consists of an ore chute which will average about 40 to 50 feet long by 4 to 5 feet wide, with a developed depth of about 200 feet, that is to say, to the tunnel level, the ore still appearing at this level. Above the upper tunnel the rich ore chute has been stoped out, apparently as far as the drifts extend, but on the two upper drifts to the left some further galena ore was being mined and the ore body may be found to extend in that direction, although not so developed in the tunnels. It must be said, however, that it looks as though the lower tunnels inside the raise had not followed the course of the lead as developed in the upper workings.

The following assays were obtained on samples taken from various points in the mine by an examining engineer:—

	Au.	Ag.	Pb.
Average sample 8 ft. ore at bottom of raise	$ 4.00	13 oz.	
In drift left, 32 ft. up on raise, 18 in. band	11.00	35	38 %
At left drift 98 ft. up on raise, 12 in. band	9.00	....	24 %
Special sample	....	101	
At face of drift, to left, 26 ft. above upper tunnel	15.00	314	51 %

Aerial Tramway.

An aerial tramway of the "Hallidie" type was erected in 1901 from the bunk-house to the lower terminal at the end of the waggon road. This tramway had been constructed down the basin, but the towers had been broken and carried away in two or three places by snowslides, as might have been expected. A tramline can, however, be located along the side of the basin, in which the towers would be so situated as to be protected and the line be at such an elevation as to escape all slides.

Lucky Boy Group.

This group, consisting of the *Lucky Boy*, *Horseshoe*, *XYZ*, *Blue Jay* and *C. H.* claims, is owned by a Philadelphia syndicate, of which Mr. C. D. Stanwood is secretary, and S. N. Alexander local manager. The property is situated about 7 miles from Trout Lake and, although not visited personally, is mentioned as being one of the shipping mines of the district. The following information has been received from the management:—

Work was started on the *Lucky Boy* in December, 1902, and has been carried on with good success during 1903. The main shaft has been sunk to a depth of 110 feet, and is being continued to a further depth. At the 50-foot level drifts have been extended to the left for a distance of 110 feet, and to the right for a distance of 75 feet. From the 110-foot drift a raise has been made to the surface, and from the right drift nearly all of the high-grade ore which has been shipped has been taken.

A second level has been started at a depth of 104 feet, where a drift has been run for 100 feet to the left, and a raise made to connect both levels. Another drift has been driven to the right for a distance of 30 feet.

Numerous open cuts have been made, exposing the vein on the surface for a distance of 500 to 600 feet. Ore is now being stoped out between the two levels. The ore showings in the shaft continue for the whole distance down, and run from three inches to one foot of clean ore. In the second level both drifts are in ore, running in width about the same as in the shaft. The ore is a high-grade galena and gray copper, and averages from 250 to 300 ounces in silver, and from 20 to 35 per cent. lead. In all about 200 tons of ore have been shipped to Nelson and Trail smelters, and the returns show that the above values are easily within the mark.

During the latter part of the year good bunk-houses have been put up and also a hoist installed. A force of from 15 to 20 men has been steadily employed during the whole year. The trail is now in good condition for rawhiding, and ore is being brought to the C. P. R. landing as rapidly as possible.

TROUT LAKE MINING DIVISION.*

REPORT OF F. C. CAMPBELL, MINING RECORDER.

I have the honour to submit herewith my report of the progress of the mining industry in the Trout Lake Mining Division for the year ending 31st December, 1903.

In the past this Division has been considered purely a silver-lead camp, but I am pleased to say that the development of the past year indicates that within the near future it will prove to be a gold-producing district of some importance. The discoveries of free gold made at Poplar creek during the early summer have seldom been surpassed in the Province for surface showings. These discoveries have incited great activity, with the result that the gold belt has been traced for several miles in either direction, and many claims located from which good values are obtained. In the older or the north-western part of the division work on the shipping mines has proceeded vigorously, with good results, while at the same time a few other properties have so developed as to be now practically on a self-sustaining basis.

Silver Cup and Nettie L.

On the *Silver Cup* and *Nettie L.*, which are being worked by different companies under one management, ore bodies of sufficient size have been encountered at a depth to warrant the installation of a combination concentrating and chloridising plant, of a capacity of 30 tons per day, for the treatment of their low-grade base ores. In addition, aerial tramways have been constructed, connecting the mines with the reduction plant. About 80 men have been employed on these works during the summer.

The *Silver Cup*, which is owned by the Silver Cup Mines, Ltd., is situated on the South Fork of Lardeau creek, about eight miles from Ferguson. On this property 1,800 feet of development work has been done during the year, consisting chiefly of a long tunnel from the *Sunshine* claim, which will cut the ore chute worked on the *Silver Cup* at a depth of 375 feet below the old workings. The output of smelting ore for the year has been 976 tons, which has given returns from the smelters of $82,212.87. In addition to this a large tonnage of second class ore has been broken down, which has been reserved for future treatment. The average number of men employed under ground has been 30, and above ground 10.

On the *Nettie L.*, owned by the Great Western Mines, Ltd., and situated on a mountain bearing the same name, 2,000 feet of development work had been done during the year. The output of smelting ore has been about 1,040 tons, giving a net return of $57,678.54. A large tonnage of lower grade ore has also been broken down on this property and reserved for future treatment. The average number of men employed underground has been 25, and above ground 10.

On the *Union Jack*, situated near 7-Mile creek, and owned by J. C. Kirkpatrick *et al.*, the cross-cut tunnel has been continued 100 feet, cutting the lead at a depth of 250 feet. At this point the vein consists of about eight feet of concentrating ore, carrying $10 in gold and 30 ozs. silver per ton.

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* *See* Report of Provincial Mineralogist on pg. 109.

On the *Triune*, owing to the destruction of the tramway during the past winter by snowslides, the work performed has been limited. Sufficient stoping has, however, been done to enable the company to ship about 100 tons of ore, of a value of about 250 ozs. silver and 33 % lead. Eight men were employed during the summer. This property is situated on Triune mountain and is operated by the Metropolitan Gold and Silver Mining Co., Ltd.

The *Black Prince*, situated at the head of Gainer creek, was acquired late last fall by Mr. Anthony Becker and associates, who immediately proceeded with work of a prospecting nature, uncovering a chute of high-grade silver-lead ore, in which a tunnel of about 40 feet was driven. Owing, however, to the lateness of the season, they were unable to equip the property for winter work, but it is their intention to resume operations in the early spring and thoroughly exploit their holdings.

The *Mohican*, adjoining the *Black Prince*, has been purchased by the Cariboo Creek Development Syndicate, which has driven about 400 feet of tunnel during the year. In the workings a large body of concentrating ore has been encountered, which can be reduced to give values of about 200 ozs. silver per ton. Nine tons of sorted ore were shipped, which gave values of about 60 ozs. silver and 30 % lead. As soon as transportation facilities are afforded, it is the intention of the company to erect a concentrating plant.

On the *Lucky Boy*, situated on Trout creek and owned by C. D. Stanwood *et al.*, the main shaft has been sunk to a depth of 110 feet. At the 50-foot level drifts have been extended to the left for a distance of 110 feet, and to the right for a distance of 75 feet. From the left drift a raise has been made to the surface. Nearly all the ore shipped has been taken from the right drift. A second level has been started at a depth of 104 feet and driven for a distance of 100 feet to the left and a raise made to connect with the upper level. Another drift has been run to the right 30 feet. Numerous open cuts have been made, exposing the vein on the surface for a distance of 600 feet, and ore is now being stoped out between the two levels. The ore in the shaft continues for the whole distance down and runs from three inches to one foot in clean ore. In the second level both drifts are in ore, running in width about the same as in the shaft. The ore is a high-grade galena and grey copper, and averages from 250 to 300 ozs. in silver and from 20 to 35 % lead per ton. Two hundred tons of ore have been shipped during the year; 17 men are employed on this property.

On the *Ethel*, which is situated on Glacier creek and owned by the same parties as the last-mentioned property, about 500 feet of development work has been done during the year. Twenty tons of ore were shipped, which gave a value of 200 oz. of silver per ton.

The *Cromwell* is situated about nine miles north-east of Trout Lake. On this property considerable surface work has been done, exposing a lead of an average width of about 4 feet for a distance of 1,500 feet. Assay values are $80 in gold and 70 oz. silver per ton. A cross-cut tunnel has been driven a distance of 200 feet; it is estimated that this tunnel continued 400 feet will cut the lead at a depth of 800 feet below the surface. The property is owned by S. J. Graham *et al.*

The *I. X. L.*, situated about one and a half miles south-east of the last-mentioned property and owned by Dr. Milloy, of Rossland, has been under lease during the year. The leaseholders have driven about 300 feet of cross-cut tunnel, cutting the lead at a depth of 200 feet, at which point a good body of concentrating ore was encountered. About 8 tons of sorted ore were shipped.

The *No. 3.*, adjoining the last-mentioned property, has been purchased by the Gold Belt Development Syndicate, which has driven about 75 feet of cross-cut tunnel. The surface showings on this property give assay values of $60 in gold per ton.

On the *American*, owned by the Mountain Lion Mining Company and situated on Haskins creek, about 1,500 feet of development work has been done during the year and 15 tons of ore were shipped. Seven men were employed on this property.

The *Handy* is situated about one and one-half miles south of Gerrard and is owned by Col. Brayton and associates. On this property is a lead about 4 feet wide, carrying gold, silver and copper values, and 150 feet of development work have been done during the year.

On the *Columbia*, situated near the mouth of Tenderfoot creek and owned by P. L. Huffman *et al.*, a cross-cut tunnel has been driven for a distance of about 100 feet. Gold values are obtained from this property.

On the *John L.*, owned by the Lardeau Valley Mines, Ltd., and situated near the last-mentioned property, a tunnel has been driven 100 feet on a vein averaging from 3 to 12 feet in width and carrying excellent gold values.

About 110 feet of work was done on the *North Star*, owned by Harry Rogers *et al.*, and situated on Rapid creek. There is a quartz lead 4 feet wide on the claim, carrying free gold.

The *Lucky Jack*, situated on Poplar creek, was located on the 9th July, 1903. Phenomenal surface showings of free gold were discovered, which resulted in the acquiring of the property by the Great Northern Mines, Ltd., which immediately proceeded with development work. About 300 feet of tunnelling have been done, as well as considerable surface work.

On the *Swede Group*, which is also situated on Poplar creek and owned by the last-mentioned company, a tunnel has been driven about 70 feet, as well as considerable work of a prospecting nature done. A test shipment of 9 tons was also made from this property to the company's mill, from which good gold values were obtained.

The *Gold Park Group* consists of three claims, situated on Poplar creek and owned by Messrs. Marquis & Gilbert. On this property there are a number of leads carrying good gold values. The work done consists mostly of stripping and open cuts. A small shipment was made to the Trail smelter, from which very satisfactory results were obtained.

The *Broken Hill*, a gold property on Rapid creek, has been acquired by Mr. C. T. Porter, of Spokane, who will proceed with development in the early spring.

The *Home Run*, on Poplar creek, another gold property, has been purchased by Mr. J. L. Whitney, of Rossland, who has let contracts for considerable development work.

The *Spyglass*, also on Poplar creek, and which has one of the best surface showings of high-grade ore in the division, has been bonded by Mr. R. G. McLeod, of Nelson, who has made a substantial payment and will proceed with development in the early spring.

The *Golden West* and *Crown King* have passed into the hands of Mr. W. F. Teetzel, of Nelson. These are also gold properties situated on Poplar creek.

Work of a prospecting nature has been done, with good results, on a great many of the claims located during the year, and the outlook for 1904 is very favourable.

OFFICE STATISTICS—TROUT LAKE MINING DIVISION.

Free miners' certificates issued to individuals	358
Free miners' certificates issued to companies	4
Special free miners' certificates issued to individuals	1
Mineral claims recorded	683
Placer claims recorded	24
Certificates of work issued	556
Cash paid in lieu of assessment work	1
Certificates of improvements recorded	26
Bills of sale, agreements, etc., recorded	176
Gold Commissioner's permissions recorded	2
Water grants recorded	5

LARDEAU MINING DIVISION.

Report of Provincial Mineralogist.

Camborne Camp. Camborne is a new town that has come into existence owing to the various mining properties which have been opened up on either side of Fish river, and is situated about six miles from the mouth of the latter. Here is located the office of the Mining Recorder of the Lardeau Mining Division. The town is only three or four years old, but has now several comforable hotels and good general stores, livery stables, etc. There is also a post office, and connection is made by telephone with Arrowhead and Trout Lake.

Of the various claims and groups of claims on the surrounding hills, three have approached the producing stage, viz., the *Camborne*, *Eva* and *Oyster-Criterion*. Other claims have developed large quantities of quartz, but the three mentioned have stamp-mills now erected and ready to operate, and it remains for these properties to show what the camp is likely to prove.

Geology. The rock formation of the district is chiefly magnesian and chloritic schists, often metamorphosed, and is probably a continuation of the similar gold-bearing belt seen in the lower end of the Trout Lake Mining Division. Here also there are two series of quartz veins, as was seen in the vicinity of Poplar creek The main series seems to have a strike parallel with the enclosing schist and is cut by a second or cross series of veins. Speaking generally, the veins of the main series appear to be the larger, sometimes having a width of 20 feet, but are not as clearly defined as the cross series, being in many places frozen to the schists or even merging into them. The second series of veins are, as a rule, clear cut, having widths up to 12 or 14 feet of pretty, clear, white quartz, and where these veins cut those of the main series, the quartz often spreads out to much greater width, while, as far as can be judged by the eye at these points of juncture, the mineralisation is greater, and it was reported that the assays were higher.

The hills to the east rise abruptly above the town and already two aerial tramways are in operation lowering quartz down to two mills, which have recently been constructed. The opportunities for cheap and extensive mining are all that could be asked for; the development work done has shown that the quantity of quartz available for mining is certainly very great, and, furthermore, it is known to be gold-bearing. It is not expected that average values will prove to be high; in fact, the properties are expected to be large low-grade propositions. As far as this camp is concerned, the extent and permanency of the quartz veins may be said to be satisfactorily proven; they carry gold values, the facilities for mining are the best, and the only undetermined factor in the problem is what the gold values of the ore, as mined and milled, will prove to be, and whether these values will leave a margin of profit. This factor should soon be determined now, for two stamp-mills are about to begin work on the ores of the locality, those, namely, from the *Eva* and *Oyster-Criterion* mines, on which two properties the greatest development has been accomplished and which may be considered as indices of the camp.

Eva Group. This group consists of the following mineral claims:—The *Eva*, *Highland Mary*, *Highland Mary Fractional*, *Iron Dollar*, *Joker* and *Last Chance*, owned by the Calumet and B. C. Gold Mines, Ltd., of which company Mr. John Knox, Jr., is local manager and superintendent. A description of this property, giving much detail, will be found in the Report for last year (1902), and need not be repeated. The group is situated on the west slope of Lexington mountain, at an elevation of 2,000 feet above and overlooking Fish River valley, about half a mile north of the town of Camborne, and slightly to the north of the *Oyster-Criterion Group*.

The *Eva Group* had been previously held by the Imperial Development Syndicate, of Nelson, which had done a great deal of development on the property, consisting chiefly of tunnels, drifts, etc., on extensive quartz veins. The development work done would amount in all to from 2,000 to 3,000 feet, and this has shown three or four main leads and several cross-leads, of large width, through which it is reported rich chutes have been defined by assays, and these chutes are said to carry from $6 to $25 in gold per ton. As far as could be learned, these enrichments were usually near the intersection of a main and cross vein, and it was suspected that the higher values were enrichments from the cross vein, in which there was more visible mineralisation and more visible free gold.

On this property the development has shown up an all-sufficient quantity of quartz, with chutes carrying good values; the average yield per ton remains to be determined by the stamp-mill.

Tramline.

An aerial tramline, 4,200 feet long, connects the mine and the mill; it passes over the small intervening summit of a spur, necessitating a span of 1,900 feet. The line built was of the standard Riblet type, with a capacity of 100 tons daily and was in excellent working order, being a difficult but well executed piece of work.

Stamp Mill.

The *Eva* stamp-mill is adjoining the townsite of Camborne and consists of a frame building of standard type, 30 by 80 feet in size, behind which is the lower terminal of the tramway and receiving bins. The plant consists of a Comet rock crusher, two 5-stamp batteries, 1,000-fb. stamps, with automatic feeders, sizers and four Frue vanners. The motive power is derived from three separate Peltons, one 65 h. p. for crusher, one 135 h. p. for stamps, and one 20 h. p. for vanners, as well as a 200 electric light dynamo. These wheels receive water from Pool creek, under a head of 400 feet, by a flume on the hillside to a penstock, from which a steel rivetted pipe 16 inches in diameter and 1,000 feet long, flanged and bolted in lengths laid on the ground, carries the water to the mill. The mill building was capable of receiving an extra equipment of stamps if required, and was to be heated by steam from a special boiler. The mill was all ready to run in September, 1903, and was about to be started when an accident happened to a valve on the main water line, and caused a shut-down until such could be repaired. The repairs were promptly made and the mill started up early in October, since which time it has been running with much regularity. Up to the end of the year, approximately 2,300 tons of ore, mined in the course of development, was run through the mill and yielded about $10 per ton, the yield being claimed to be 92 % of the assay value. The greater part of the gold is caught on the plates, but some concentrates are collected, which are worth about $30 per ton. The plant has not been in operation long enough to give reliable data as to the percentage of concentrates produced from a ton of ore, but it is roughly estimated at from ½ to 1 %.

Camborne Group.

The *Camborne Group*, including the *Gold Finch*, is situated on the west side of Fish river, about two miles above Camborne, on Menhenick creek, and about 1,600 feet above the valley. The property is held by the Northwestern Development Syndicate, of Hancock, Mich. Considerable development was done underground, and a large quartz vein, supposed to be the *Eva* vein, was opened up. An aerial tramline (Hammond), 4,800 feet long, was built from the mine to a 10-stamp mill, operated by water power, in the valley. Much detail of the workings of the property was given in the Report for 1902, and so will not be here repeated. The company got into financial difficulties some time during last summer, and the plant was closed up after a short run; consequently, it was not seen in operation by the writer. A meeting of the shareholders was held at Hancock, Michigan, on December 26th, '03, to consider a proposal for the reorganisation of the company, and the Northwestern Trustees Securities Co., Ltd., a company formed for the purpose, has undertaken to provide money to continue the operations. While in operation the mill is reported to have milled 800 tons of ore, from which was extracted bullion worth $8,000, or $10 per ton. The surface showings originally found on the *Gold Finch* are said to have been about the best discovered in the district.

The *Cholla Group* consists of 10 claims, situated adjoining the *Eva* and *Oyster-Criterion Groups*, and contains quartz leads of the same description. The *Cholla* and the *Eva Groups* were both held by the Imperial Development Syndicate, Ltd., A. H. Gracey, of Nelson, manager, but it is understood that the former property was retained by the syndicate when the *Eva* was sold. Assessment work has been done on the property and a number of quartz leads uncovered, which are similar to those on the adjoining groups under development, and from the results of the workings of these groups the future prospects of the *Cholla* will be indicated. Some six men were employed during the summer.

Oyster-Criterion & Imperial Groups.

The *Oyster-Criterion* and *Imperial Groups* are adjoining, and for all practical purposes may be considered as one. They consist in all of 10 claims. These claims are situated on Lexington mountain, on the east slope of Fish river, some six miles from its mouth and directly overlooking the town of Camborne. The two groups were held by the Ophir-Lade Mining Syndicate, but have been absorbed by the Great Northwestern Mines, Ltd., already mentioned in the Trout Lake Report.

Development.

The various claims have been prospected by open cuts, strippings, etc., which have been sufficient to demonstrate that quartz veins of considerable size may be found on most, if not on all the properties, but the actual development workings of the groups have been confined to the *Oyster*, *Criterion* and *Rossland.*

The *Criterion* tunnel is an adit, and for its first 75 feet runs about north, cross-cutting the formation till it reaches a vein near the point at which the latter had been prospected by an old shaft. This vein is known as the "galena lead," and is probably one of the cross-vein series. On this a drift has been run for 560 feet in a direction N. 50° E. This drift, at about 100 feet in, cuts a vein on which cross drifts have been run to the left for 30 feet and to the right for 165 feet. This is known as the *Criterion* lead and is one of the main veins on the property, having a width up to 15 or 20 feet. Nearer the inner end of this tunnel a second main vein has been cut and drifted on some 20 feet to the left and 5 feet to the right. This vein, it is claimed by the management, is the same as the No. 3 vein proved upon the *Eva.*

On the *Rossland* claim the *Rossland* tunnel has been driven in at the same level as the *Criterion* tunnel. The *Rossland* tunnel is 140 feet long and, at 130 feet, cuts the *Criterion* lead, on which latter drifts have been run. The drift to the left is 150 feet long and comes out to "grass roots"; from this drift a winze has been sunk in quartz. The drift to the right of the tunnel is in 175 feet, and is running in the direction of the first cross-cut to the left from the *Criterion* tunnel, with which drift it is expected to connect in about 150 feet. When this connection is made, the ore, etc., will be taken out through the *Criterion* workings.

About 150 feet vertical below the *Criterion* tunnel, a lower tunnel has just been started, which is planned to be the working tunnel of the property and through which, when connections are made, all the ore will be taken out.

Veins and Ore.

Almost all the workings noted in the development have been in quartz and on veins of workable and sometimes large size, capable of being mined at very low cost. The work done quite justifies the claim of an almost unlimited supply of quartz, so situated as to be easily and cheaply mined and transported to the mill site. The quartz is dull white in colour, in places "banded" in appearance, and may be regarded as a true vein formation, as indicated in the general remarks on the camp. There is in the veins a small percentage of iron pyrites, galena and other sulphides which carry gold, but the greater proportion of the values claimed for the ore is gold in a free state in the quartz. Fine free gold can occasionally be seen in the quartz, and without doubt it also contains free gold not visible, except after crushing and panning. As in all large free gold propositions, the gold values will be found in local chutes rather than uniformly distributed, which renders sampling, except on a very large scale, quite unreliable and worse than useless because so misleading. Assays can be and have been obtained here varying from nothing up to hundreds of dollars to the ton. What the average value of the ore is can only be obtained from the stamp-mill. The management claims that "average samples" assay from $5 to $20 per ton in gold, with correspondingly higher assays right across the face at certain times. The facilities for mining, such as tunnel sites, good and cheap timber, facilities for transportation, water power, etc., together with the mass of quartz in sight, should admit of a low-grade ore being worked to a profit, and if worked on a large scale under competent management, $4 or $5 ore should be able to pay well. The mill is now in operation, and the results of practical runs will be watched with much interest, as this "sampling" affects the valuation of the camp and district.

Tramway.

Just below the lower tunnel have been erected the bins and upper terminal of an aerial tramway, built by Riblet, some 3,500 feet in length, with a drop of, approximately, 2,000 feet, and leading directly to the bins of the stamp-mill. This tram, of the usual Riblet type, was just about completed and was first-class in every way. The ore from the dump at the upper tunnel will be lowered by a surface "gravity" tram to the upper terminal bins of the aerial tramway.

Mine Buildings.

Near the upper tunnel there had been constructed a comfortable log cook and bunk-house, as well as a house for the mine foreman, while near the lower tunnel and upper terminal of the aerial tram a log blacksmith shop had about been completed.

Stamp-Mill.

On the flat in the valley at the town of Camborne, a stamp-mill, of Fraser & Chalmers manufacture, has been erected and consists of:—Bins and an 18-inch x 10-inch Blake crusher, two 5-stamp batteries (1,000 lb. stamps), 3 sizers, 3 Frue vanners, etc., all driven by Pelton water-wheels, developing, under a head of 280 feet, 300 horse-power in all, which is also the motive power for a Rand air-compressor for supplying compressed air for the mine, to which a pipe-line has been laid. The mill was about complete in October, except for certain pipe connections, the material for which had been delayed in transit. It has since been learned from one of the Directors of the Company that the mill was started up in December and was working quite satisfactorily. The mill building has been constructed large enough to permit of ten more stamps being added at any time.

LARDEAU MINING DIVISION.*

REPORT OF GEO. SUMNER, MINING RECORDER.

I have the honour to submit herewith my report of progress in the Lardeau Mining Division for the year ending December 31st, 1903.

I am happy to be able to state that a decided improvement over the year 1902 is to be seen in the mines of the district. Since my last annual report two mills have been installed, each of ten stamps, one at the *Eva* mine, the other on the *Oyster-Criterion* properties.

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* *See* Report of Provincial Mineralogist, p. 127.

Eva Group.

At the last general meeting of the shareholders of the Calumet and B. C. Mines, at Nelson, B. C., the manager, Mr. J. F. Musselman, submitted the following report:—"Your Company took possession of the *Eva Group* of eight Crown-granted claims on October 12th, 1902, from which date development work was carried on more or less aggressively throughout the year, except during the month of May, when no work was done at the mine, owing to the breaking up of the trail, which prevented the getting in of supplies.

"The year's underground work aggregates 746 feet, distributed as follows:—No. 7 tunnel, with drifts, 360 feet; No. 3 tunnel, 249 feet; No. 1 tunnel, 31 feet, and raises 106 feet. The average cost of tunnelling was $11.45 per foot, and of raising $7.30 per foot.

"The No 7 is designed as the present working tunnel, and when fully extended will undercut the uppermost showings on the property at an approximate depth of 700 feet. Because of a large slide which prevented the driving of an adit tunnel, the tunnel proper was run as a cross-cut a distance of 269 feet, at which point the No. 2 vein was reached in the latter part of August and drifting both ways, following the wall of the vein, was commenced. The east drift, running into the mountains, has been driven 65 feet, and the west drift, running towards the slide, 31 feet. The wall was encountered at a point 225 feet vertical below the surface; it is also 225 feet from the surface in the direction taken by the west drift. In the direction of the east drift, it is 305 feet to the ore chute developed by tunnels 3 and 5, and 285 feet to point where connection may be made, by upraise, with winze in No. 3. Depth of winze is 78 feet; upraise required to make connection, 140 feet. Both drifts have followed, throughout, a stringer of from 2 inches to 6 inches of $60 ore lying against the wall. In the direction of the east drift, nothing of importance is expected, until the ore chute above referred to is reached. In the opposite direction we are momentarily expecting to encounter this chute in the west drift. The upper terminal of the tram is located 110 feet below the portal of this tunnel.

"The No. 3 tunnel, at the point where we took it up, has just passed through the ore chute, which at present constitutes our chief reserve of available blocked-out ore, and, as was also expected, our progress has been through practically barren ground, so far as our ability to treat it at a profit, with our present plant, is concerned. However, the tunnel has now reached a point where we may momentarily expect good news from it, as indicated by surface showings. The raises were made as a preliminary to stoping.

"We have now blocked out and immediately available, by means of No. 3 and No. 5 tunnels, approximately six months' supply of ore for the mill. To make the large ore bodies developed by the No. 6 tunnel and the *Highland Mary* shaft conveniently available, much further underground work, involving a connection between those works and the No. 3 and No. 7 tunnels, is necessary. We may reasonably expect to open up further reserves in both the No. 3 and No. 7 before accomplishing such connection.

"It is very necessary that we facilitate in every way possible our underground development work. Our most pressing need in this respect is for a compressor plant and power drills, by which we could not only make much greater headway during the time consumed, at the same time lessening our costs very materially, but could work three shifts of eight hours each, whereas we can now work but two shifts of eight hours each, on account of bad air. The question of ventilation will be a serious one until we have means, other than hand-blowers, to provide it.

"As soon as the snow left the ground last spring, we began the construction and installation of a reduction plant, comprising, as main features, a stamp-mill, tramway and water-power installation. The mill, of Fraser & Chalmers' make, comprises two batteries of five 1,050-pound stamps each, Comet crusher, automatic feeders, amalgamating tables, cone sizer, four six-foot Frue vanners, and is in every way complete in all the adjuncts necessary to a free-milling and concentrating reduction plant. The foundations of batteries and crusher are imbedded in bedrock.

"The heating plant consists of a 25 horse-power boiler, locomotive type, with all necessary pipes and radiators. The power installation includes flume, pipe-line and motors. The flume, 4,000 feet in length, is of 2-inch plank, with 36-inch base, 12 inches high; the standards, however, are 24 inches high, permitting the addition of another 12 inches to the height of the flume, which would double its carrying capacity. The pipe-line, 1,032 feet in length, is made up of 446 feet of 10, 11 and 12 gauge 16-inch pipe, and 586 feet of 14 gauge 18-inch pipe, flanged, jointed and firmly anchored throughout. The water is delivered to the motors under 400 feet head.

"The motors, Pelton pattern and three in number, are installed in a wing of the main mill building, and are specified as follows:—One 3-foot wheel, developing 135 horse-power, for driving stamps; one 24-inch motor, developing 65 horse-power, for running crusher; one 15-inch motor, developing 20 horse-power, for running vanners. The latter, being supplied with governor and cut-off hood, is also made to do duty in driving a 12½ K. W. 220 horse-power dynamo at present used for lighting purposes only. We have now available at the mill a total of 400 H.P., which, should occasion demand, only requires the installation of additional motors for its full utilisation. By installing an additional 600 feet or 700 feet of pipe to take up waste water at the mill and deliver it at a point some 100 feet vertically lower, where, in addition to the five acres originally granted us as a mill-site, we have acquired a small but valuable piece of ground, an additional 100 horse-power could be developed.

"Our double-rope system tram, with a capacity of 100 tons in 10 hours, was supplied and installed by the B. C. Riblet Company, and though very difficult to construct, owing to the contour of the country, works to our entire satisfaction.

"It should be noted that the design of the entire plant provided for an increase of capacity to 40 stamps at the least possible cost; the size, strength and capacity of power plant, tram, crusher, shafts, belts, pulleys, etc., being considered in this general design.

"Further improvements and equipment required at this time include, in addition to the compressor plant before referred to, a bunk and boarding-house at the mine, a house at the mill to accommodate the men employed there, and a covering for the flume. With respect to the three last-named improvements, orders have been given and the work will be prosecuted with the greatest possible expedition.

"Though we have had many difficulties, even reverses, with which to contend in the installation of our plant, amongst which may be mentioned the exceedingly inclement weather throughout the season, the non-delivery of lumber when most required, the exceptional obstacles to transportation, etc., by reason of which the plant did not go into commission until two months after the date on which it might have started under ordinarily favourable conditions, I think we have every reason to look forward with confidence to the results of our enterprise."

Mr. Musselman further says:—

"Since the date of the above report (September 30th, 1903) our mill has made its initial run, a brief account of which should prove interesting. The plant, as above described, went into commission on October 4th, but ran only a few hours, when the valve in the main pipe-line burst, necessitating a shut down of several days to make repairs. With the exception of a few minor mishaps, the mill ran steadily and uninterruptedly during the rest of the month, running a total of 499 hours; crushing 705 tons of ore, or 3.38 tons to the stamp per 24 hours, yielding 395.5 ounces bullion, valued at $5,533.02, and 4½ tons concentrates, valued at $100, representing an average recovery of about $8 per ton, and an extraction of 87 per cent. of assay value of ore. Considering the newness of the plant and the fact that the entire tonnage came from dumps in which there was considerable waste, the results, I think, should be regarded as satisfactory. Considering the character of our ore, we are in no wise pleased with percentage of values recovered, and are now making experiments, with every reason to believe that we shall be able to obtain better results in this respect. The tailings are being impounded for further treatment by cyanide or otherwise, if justified.

"With respect to recent underground development, I am able to give you at this date, November 17th, a gratifying report from No. 7 tunnel. Though still 180 feet from the ore chute for which we are driving by means of the east drift, we now have in the face of that drift 12 inches of entirely free-milling ore that should mill $100 per ton. In the west drift we have 15 inches of the same character and about the same grade of ore.

"For reasons beyond our control, but little progress has been made in No. 3, but we now have two feet of quartz in the face, assaying $4 per ton (an average sample from across the entire face assays $3.50 per ton), with every indication pointing to our near approach to a chute of payable ore."

Ophir-Lade.

The Ophir-Lade Company owns the *Oyster* and *Imperial Groups* of claims, which adjoin the *Eva Group*. Heretofore the company has not published any reports of its doings, but from what I could learn, it is working energetically and its stamp-mill, compressor plant and aerial wire tramway are running smoothly. Some gold bricks, the result of the first clean-up, were turned out a few days ago, but I have not been able to ascertain the values.

Camborne Group.

This property, which consists of eight Crown-granted claims, some of which have good surface showings of free-milling gold quartz, was held by the Northwestern Development Syndicate, but this company suspended operations during the past summer. I am glad to report now that a new company (Gold Finch Mining Co.), has been organised to take hold of the property. This latter company has let contracts for the purpose of developing the veins on the *Gold Finch* claim, with the evident intention of getting a good supply of ore in sight before putting the stamp-mill in operation. The ore will be brought to the mill by an aerial wire tramway, which extends from the *Gold Finch* claim for a distance of 5,000 feet, to the mill near the mouth of Menhinick creek. The tram is equipped with 12 buckets, having each a carrying capacity of about 800 pounds of ore.

The mill is a ten-stamp one, with mortar blocks in place for ten additional stamps when needed, and is driven by electric power furnished by a Pelton water wheel and two dynamos, one of 110 volts and the other 220 volts. These same dynamos also furnish power for driving the electric drills, a saw-mill, and for lighting the buildings.

The Beatrice Group.

This group comprises three Crown-granted mineral claims, owned by the Beatrice Mines, Ltd. The property, on which there is a large quantity of galena and zinc ore, has been handicapped for want of a decent trail, but this has now been remedied, as the new trail (which is a good one) is nearly completed. Under adverse circumstances, this property has shipped to the smelter about 445,000 pounds of ore to date.

Considerable excitement was caused during the past summer by the reported discovery on Goat mountain, near Boyd creek, of a very large ledge (about 60 feet wide), of galena ore. It is thought that a large production will be made from this vicinity in the near future. The only means of access at present is by a very bad trail.

OFFICE STATISTICS—LARDEAU MINING DIVISION.

Mineral claims located	135
Certificates of work issued	318
Bills of sale recorded	120
Certificates of improvements recorded	37
Free miners' certificates issued	210

SLOCAN DISTRICT.

Report of E. E. Chipman, Gold Commissioner.

I have the honour to submit my report on the Slocan District for the year 1903.

Adverse conditions have prevailed in the mining industry in the Slocan District during the year. The low price of silver and lead in the early part of the year; the unsatisfactory condition of the zinc market, and the deferring of the relief expected from the lead bounty provided by the Dominion Government until the latter part of the year, have, perhaps, been the principal causes.

While the ore shipments have fallen off nearly one-half, confidence in the future has not abated, and development has been carried on to an increased extent in nearly all the important mines, while a large number of new properties have been opened up, and will be ready to enter the list of shippers in the near future. Improved machinery for the better treatment of zinc ore, and to make it a more desirable and marketable commodity, has been introduced at a number of the larger mines, and this, with the better prices now prevailing, and the distribution of the lead bounty which is now available, make the outlook for an increased production and a prosperous year in 1904 very encouraging.

SLOCAN MINING DIVISION.

Report by Angus McInnes, Mining Recorder.

I have the honour to submit herewith my annual report and office statistics for the Slocan Mining Division for the year ending December 31st, 1903.

The Payne.

This property has been working continually during the year, and the company is now sinking a double-compartment shaft and installing hoisting machinery and pumps. In conjunction with the concentrator at the mine, a magnetic separating plant, for zinc ores, has been erected and is, I am informed, a great success. The development work during the year amounts to about 670 feet of tunnelling and shafts, and the output of ore was approximately 1,300 tons. The property is managed by Alfred C. Garde, who has made a wonderful improvement in both the mine and plant during the last three years.

The *Slocan Star*, under the management of Oscar V. White, has been worked with a reduced force during the year, the work being principally confined to developing the mine, although a great deal of ore has been taken out and shipped. It is the intention of the management to increase the force and output in the early spring.

On the *Ivanhoe*, as on the *Slocan Star*, operations were confined to development work. The manager, P. Hickey, has secured a new cable for the tram-line, and when this is put in place, both the tram and mill will be in good shape for a long run. There is a large quantity of lead and zinc ores in reserve in the mine, and it is the intention during the coming year to make heavy shipments.

The Monitor Group.

This group is situated near Three Forks, and has been for the last five years under the management of Maurice Gintzburger. During the year operations were principally confined to development work, and in the process about 750 tons of silver lead ore were extracted. It is the intention to increase the force of men employed.

On the *Rambler* there has been a great deal of development work done during the year. A shaft has been sunk 100 feet deep, and from this shaft the management has drifted about 800 feet on the different levels, and has also started a new tunnel, which will be about 4,300 feet long, to tap the lead at a depth of about 600 feet.

On the *Last Chance* there has been a great deal of work done during the year, and it is the intention of the management to carry on still more extensive operations during 1904.

Development work on the *Reco* (J. M. Harris, manager) for the year includes about 550 feet of tunnel and nearly 200 feet of raise. The output for 1903 was about 150 tons of high-grade ore.

The Ruth Mines.

There has been a large amount of development work done at this company's mine during the year, and about 800 tons of ore shipped. Large bodies of ore have been blocked out, and it is expected that the property will ship very extensively during 1904. H. B. Alexander is manager.

On the *Antoine* work has also to a certain extent been confined to development. About 3,000 feet of tunnel has been run during the year, and about 200 tons of silver-lead ore shipped. It is the intention of the management during 1904 to run a long tunnel to gain a further depth of about 500 feet. George Alexander is manager of the mine.

From the *Idaho-Alamo* about 500 tons of ore were shipped during the year, and a great amount of development work done. The mill has been thoroughly overhauled and is now up to date, and a new tramline has been put in between it and the mine. It is expected that during the coming year a large tonnage will be shipped. W. S. Jenkins is manager of the mine.

The *Mountain Con* has been worked in a small way under lease, and is showing up well under development.

The *American Boy* has produced during the year about 700 tons of silver-lead ore, and the development has been kept well ahead. The buildings were all destroyed by fire about the first of December, but new ones are now being erected, and all will be ready to start operations again in a short time. Thomas McGuigan is manager of the property.

On the *Washington* (John L. Retallack, manager) a considerable amount of development work has been done during the year, and large bodies of lead and zinc ores have been exposed.

The *Vancouver*, near Silverton, has been developed in a small way during the year, and I understand that it is the intention of the manager (Leslie Hill) to carry on the work more extensively during 1904.

The *Bosun*, situated near New Denver, has shipped during the year over 1,000 tons of high-grade silver-lead and zinc ores, but for the last three months the mine has been closed down, for reasons unknown here. W. H. Sandiford is manager of the property.

The *Fisher Maiden* (Geo. Long, manager) is situate about 7 miles above Silverton, on Four-Mile creek, and has been worked in a small way by a few men during the last year. About 280 tons of high-grade dry ore were shipped, and I am informed that it is the intention of the management to develop the property more extensively during the year 1904.

The *Lucky Jim* is situated near Bear lake, and has been taken over within the last month on a bond by Mr. George H. Hughes, one of the leading mining men of the camp, who will, it is believed, start development on a large scale.

The *Mercury* is owned and operated by Messrs. Drewry, Twigg & Cunning, and is showing up well under development. The property is situated near the *Payne* mine, Sandon.

The *Queen Bess* was worked under lease in the early part of the year, but nothing has been done for the last nine months. The property is now owned by the Bank of Montreal, and it is understood that a local syndicate is about to take it over.

The *Red Fox*, situated in McGuigan basin, is owned and operated by George Aylard *et al.*, who worked it for about nine months during the year, but were forced to close down about three months ago, on account of the scarcity of snow to rawhide the ore.

The *Wakefield*, belonging to the Wakefield Mines, Limited, is situated about four miles above Silverton, on Four-mile creek, and has been operated by T. R. Lane under lease for the last two years. The output of ore for 1903 has been about 200 tons, and Mr. Lane has expended a large amount of money during the year in repairing the mill and tramline, which are now up to date.

The *Hewett* has been idle during the greater part of the year, but has lately been worked under lease by Mr. Davis, of Nelson.

The *Lorna Doone* has also been worked under lease during the year by Mr. Robert Sutherland & Co., and is showing up well.

On the *Capella* the usual amount of work has been done, and two cars of ore have been shipped during the year. The property is owned and operated by W. R. Will and N. F. McNaught. It is a dry ore proposition and carries high values in silver.

The *Mollie Hughes* and *Pinto* are two adjoining properties situated on Slocan lake, near New Denver, and owned by a local syndicate. They are worked at present under lease, Messrs. Horton & Co. operating the *Pinto*, and Messrs. Sheran & Co. the *Mollie Hughes.*

The *Comstock* is owned and worked by W. Hunter, of Silverton, and it is now considered to be one of the best mines in the Silverton Camp. Mr. Hunter has done a considerable amount of development work on the property during the year, and has now large bodies of ore blocked out ready to stope and ship.

The *Rowse Fraction* is situated on the North Fork of Carpenter creek, and promises to be among the big shippers during the coming year. It is also owned and operated by Mr. William Hunter.

The *Democrat* and *Conductor* are also being worked under lease in a small way.

The *L. H. Group* of claims is situated near Silverton, and is owned and operated by A. R. Fingland & Co. The values are in gold and are very high. The vein has been tapped at a great depth, and it has been found that with this depth the values increase.

I might mention here that the output of ore from this district has been greatly retarded during the fall and winter by the want of snow, rendering transportation of ore by rawhiding impossible.

OFFICE STATISTICS—SLOCAN MINING DIVISION.

Free miners' certificates issued, ordinary	433
" " companies	11
Certificates of work issued	320
Locations recorded	104
Transfers and other documents	76
Certificates of improvements issued	21
Traders' licences	37
Cash paid in lieu of work	$1,537

SLOCAN CITY MINING DIVISION.

REPORTED BY H. P. CHRISTIE, MINING RECORDER.

I have the honour to submit my annual report on the Slocan City Mining Division for the past year (1903).

The mining that has been done is satisfactory in a measure, inasmuch as it has shown the ore bodies to be continuous with depth, although nearly all the work done has been confined to development, the tonnage of ore shipped being smaller than in previous years. The owners and operators of the various mines are discontinuing shipping, with a view to installing mills for the more economical treatment of their low-grade, silicious ores, for which purpose experiments are now being made. The system of leasing is becoming more popular and so far seems to be successful.

SPRINGER CREEK.

The *Arlington* shipped 40 tons of ore. Work on this property has been entirely confined to development, about seven or eight men only being employed for the best part of the year. The company definitely announces that it has found a satisfactory method of treating its ore, and it is the intention to erect a suitable mill at an early date.

The *Speculator* has employed about 10 men for the year, wholly on development work.

The *Black Prince* is now under lease to Messrs. Mulvey and Murphy, who are so far meeting with good success; they have shipped two carloads of high-grade ore and intend shipping several more through the winter.

The *Bank of England* has been bought and is being worked by the Pioneer Mining Co., of Nelson. This company employs about eight men, who are engaged in running a cross-cut tunnel to tap the lead. The surface indications are very good.

The *Two Friends*, adjoining the above, has not been worked to any appreciable extent during the year.

The *Ottawa* has been steadily worked during the year with 12 to 15 men, who have driven about 1,500 feet of drifts and have encountered the vein at a vertical depth of over 200 feet. In the last 100 vertical feet the ore chute has increased in size and still retains its former values. The amount of ore shipped is about 145 tons. It is of a combined limey and silicious nature, and carries native silver, argentite and freibergite.

The *Myrtle Group* has been operated most of the year by four men engaged on development work. The character of the ore is the same as that of the *Ottawa*. The work accomplished consists of a shaft 50 feet and 100 feet of drifting at the bottom of the former. The water has forced them, however, to run a long cross-cut tunnel of 450 feet; this will give 100 feet of depth on the vein, which they expect to reach in May.

The *Republic* had about a dozen men working for the greater portion of the year and shipped about 70 tons of ore. The mine is now being worked by "leasers," but the company states that it intends working again itself in the spring.

The *Meteor* was worked under a lease by four men for about six months and they shipped 52 tons of very high-grade ore. This property is unique, inasmuch as a mineral named "scheelite"* was found in small quantities. It occurs in the quartz in lenses varying from two to three inches in width and one to three feet long. About 500 pounds were taken out after it was identified. This is the first time this mineral has been met with in this Province, if not in the Dominion.

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* Calcium Tungstate ($CaWO_4$).

The *Hampton* has done a little development and shipped a sample of five tons of ore.

The *Cripple Stick* was acquired by F. Stock, of Seattle, and is now undergoing development, after shipping a sample of two tons.

The *Dayton* has been under lease and is being developed by a few men, making a small shipment of twelve tons.

The *Port Hope* is leased and is being worked, with very encouraging prospects.

The *Bondholder* was under lease and made a small shipment of two tons.

TEN-MILE CREEK.

The *Enterprise*, after work being discontinued by the company, has been worked under a lease by local mining men, with marked success. There have been from 20 to 50 men steadily employed since the commencement of the lease, and 895 tons of ore were shipped at a good profit.

The *Hamilton*, *Nansen*, *Westmont*, *Kalispel*, *Highland Light*, *Sapphire* and some others have been worked in a small way by the owners.

The *Mabou* and *Ohio* have undergone a good deal of development by the owners.

LEMON CREEK.

On the *Legal* about 150 feet of drifting has been done, giving much the same results as last year.

The *Howard Fraction* has been acquired by American capital and has done some development.

The *Alberta* has been steadily worked for the past year by four men; they have made a small shipment and the vein appears to be very continuous, carrying gold and silver values.

The *Hoodoo*, *Kilo* and some others have had a little work done upon them.

The most striking features determined by the last few years' development are the large, low-grade veins on Springer creek, which have been proved to be continuous both in depth and length, but, although containing chutes of high-grade ore, the bulk of it in the vein is too low-grade for shipping and smelting. In the advent, however, of a good metallurgical process for the more economical treatment of these ores, a great future is assured for this district, as the tonnage of the veins of the *Black Prince*, *Arlington*, *Speculator*, *Ottawa*, *Myrtle* and some others of the same class would be large. Moreover, it has been definitely announced by experts that a satisfactory treatment has been evolved to make a complete success of the mining here.

OFFICE STATISTICS—SLOCAN CITY MINING DIVISION.

Free miners' certificates issued	238
Certificates of work recorded	390
Fresh locations recorded	141
Conveyances, &c., recorded	126
Crown grants issued	18

AINSWORTH MINING DIVISION.

REPORT OF E. E. CHIPMAN, GOLD COMMISSIONER.

Notwithstanding the depressed condition of the mining industry in the district, assessment work has been well kept up, and a large number of the claims have been Crown-granted. In the Ainsworth Division the new locations have more than doubled, an increase due, no doubt, to the recent gold discoveries in the Trout Lake Mining Division, which have proved an incentive to closer and more effective prospecting in a practically new country. It was found that the territory in which the Poplar creek discoveries were made was an extensive one, and covered the larger portion of the northern part of the Ainsworth Mining Division, and many discoveries of gold-bearing ledges have been made on Cascade, Cooper, Meadow and Davis creeks, while it is believed that the same conditions extend to the headwaters of Wilson, Schroeder, Lyle and Whitewater creeks. Extensive preparations are now being made to thoroughly investigate the value of the territory drained by these creeks, as soon as the snow goes in the spring.

HAMILL CREEK.

Argenta Mines.

The Argenta Mines Company has had a force of 10 men constantly employed on its property during the year, doing development work only. Nearly 1,000 feet of tunnel were driven, and upraises have been made connecting the new tunnel with the older workings. Large bodies of ore have been opened in the last working, and the result of the development was of such a satisfactory character that two new tunnels will be driven at lower elevations on the ledge during the year, one of 1,000 feet and the other 1,500. The company intends putting in machinery early in the spring, as soon as the work on the waggon road is completed and enables them to get in the required plant. The estimate of 27,000 tons of ore blocked out last year has been more than trebled by the past season's work. Application is now being made for Crown grants for the property of the company, consisting of 16 claims.

The *Lavina-Butte Group* has been shut down during the year, waiting for the completion of the waggon road, which will enable the ore to be transported.

The *McLaughlin Group* of claims, further up the creek, and adjoining the above-mentioned mines, has kept up development work almost continuously during the year.

SOUTH FORK OF KASLO CREEK.

The *Province* has employed 6 men constantly during the year, principally in development work. About 400 feet of tunnels have been driven, and 200 feet of upraises, winzes and cross-cuts have been made. Shipments of ore were begun in December, and will be continued during the year. The owners contemplate driving an 1,100 foot cross-cut tunnel during the year.

On the *Cork* 15 men have been employed continuously during the year, 1,100 feet of cross-cut tunnel has been driven and several hundred feet of drifting on the ledge has been done. A continuous body of ore has been exposed in one of the drifts for a distance of over 400 feet. The owners intend putting in a concentrator in the spring for the treatment of the large body of ore now in sight.

Two men have been working on the *Bismark* the greater part of the year in development work, and a sufficient amount of ore has been taken out, at present prices, to remunerate the owners for their outlay.

WOODBERRY CREEK.

On this creek, the Slocan Development Company, the *Baltimore Group* and the King Solomon's Mines Company have been working steadily during the year, each with a small force of men. 125 tons of ore have been shipped during the year.

AINSWORTH CAMP.

The Highland (Kootenay, B. C.) Mining Company, the property of which is situated on the north slope of Cedar creek, has employed on an average 50 men constantly, throughout the year in the mill and mine. Ore mined and milled during the year, 24,000 tons; concentrates shipped, 2,967 tons; development work done, not including stoping, 1,000 feet.

Highlander Mine.

The Highlander Mill & Mining Co., operating this property, started a cross-cut tunnel in June, 1899, in order to cut its ore bodies at a depth, to prove the continuity of the veins in the camp and to obtain cheaper facilities for handling its ore. The main vein was cut at a distance of 1,560 feet from the portal, and was shown to have at this point a width of 72 feet, as against 42 feet on the surface. The depth obtained on the pitch of the vein at this point was 980 feet. A drift was then run on the footwall of the vein, a distance of 700 feet, disclosing payable ore bodies at a distance of 450 feet. The ore is principally of a concentrating grade, but bodies of clean shipping ore were frequently encountered, assaying 70 % lead and 35 ounces silver. In the past year the work consisted of 130 feet of raise and 100 feet of drift. In the raise a fine body of zinc was encountered, running 29 % zinc and 6 ounces of silver. The main tunnel has been continued to a length of 2,250 feet, and all veins showing on the surface have been encountered, with one exception. The property is equipped with a 100-ton concentrator and 3-drill compressors, and the mine is operated by a 150 H. P. water-power system, having probably the greatest head in the Province, the difference in altitude between the penstock and wheel being 1,075 feet. The *Highlander* is the deepest developed property in the Ainsworth camp, and has done much to give confidence in the continuity at depth of the ore bodies and their values.

OFFICE STATISTICS—AINSWORTH MINING DIVISION.

Free miners' certificates, personal	507
" " companies	6
" " special	2
New claims recorded	631
Transfers recorded	151
Certificates of work issued	569
Payments in lieu of work	2
Placer claims recorded	1
Water records issued	19
Pre-emption records issued	39
Certificates of improvement issued	95
Certificates of purchase issued	9
Existing Crown-granted mineral claims on roll	1170

NELSON DISTRICT.

NELSON MINING DIVISION.

REPORT OF ROBT. A. RENWICK, GOLD COMMISSIONER.

The advancement made in mining in the Nelson Division during the year 1903 is to be found rather in the improved condition of a number of the more promising properties than in the number of claims recorded. The depression which characterised the year 1902 was quite as much in evidence during the first half of the succeeding year, and this undoubtedly had its effect upon prospecting.

Throughout the district attention was very largely confined to the gold properties in the Ymir camp and to the belt south-west of Nelson, and in both sections very gratifying success was met with. In the Ymir section, the *Ymir* mine, which for years has been the leading property of the district, has not yet emerged entirely from its difficulties, but there is every reason to believe that the management will be able to make a much better showing for 1904 than was the case in the year under review. Of the greatest importance has been the result of the year's work on the *Hunter V.*, the *Wilcox* and the *Foghorn* properties, all of which goes a long way in establishing the extent and permanency of the ore bodies of that section. In the vicinity of Nelson the result of the year's work has also been most encouraging, considerable shipments having been made from the *Silver King* under the lease held by Mr. Davys, while greatly improved conditions have resulted from the work done on the *Athabasca-Venus* and the *May and Jennie* properties.

Placer mining along the Salmon River, with respect to which there was a great deal of activity during the fall of 1902, did not come up to the general expectations. Of the work that has been done, it may be said that it demonstrated that there was not much money to be made from individual claims along the stream, and on both the Salmon and Pend d'Oreille work during 1903 was held in abeyance awaiting the outcome of attempts to consolidate individual interests. When the season opens at least one company will commence operations on a comparatively large scale.

HALL MINING AND SMELTING COMPANY.

The business of this company during the past year was restricted largely to the operation of a customs smelter at Nelson, the *Silver King Group* of mining properties, owned by it, being under lease to M. S. Davys, a former superintendent of the mine. The fiscal year of the company ends on June 30th, and in the last report submitted to the shareholders a deficit of something over $20,000 was shown as the result of the year's working. In the company's mine account a profit of $3,500 was shown as the result of the royalties paid by the lessee of the mine; and in the smelter account a profit of £1,694 was shown, but as this was subject to a greater charge of £3,890 for maintenance and depreciation, the net result was a loss of the above mentioned sum. The very unsettled condition of the mining industry during the year is the explanation offered by the management, it being found impossible to secure either a constant supply of ores or desirable fluxes.

The close of the year marked the passing by the Federal Government of a bounty measure for the producers of lead whose product was smelted in the Dominion. This was the outcome of a movement to afford the mining industry relief through the medium of increased duties upon imports of lead into Canada, but the arranging of the preliminaries with respect to the payment of the bounty occupied so much time that the year afforded no opportunity for determining just what stimulus the bounty will give to the industry, although that it will be of considerable benefit goes without saying.

Of the ore treated in the company's smelter during the last fiscal year 7,500 tons were classed as dry ores, 5,270 as lead ores, 4,000 as roasting ores. The shipments of the smelter for the year consisted of 1,023,250 ounces of silver; 8,000 ounces of gold; and 3,350 tons of lead. The large furnace of the company was in blast 222 days and the smaller furnace 165 days. During the last six months of the calendar year the company smelted 10,180 tons of ore, mined 12,329 tons of ore at the *Emma* mine, in which it has a large interest, and received 2,618 tons of ore from the *Silver King* property.

At the *Silver King* mine, work was carried on by the lessee throughout the year, during which period the shipments aggregated about 4,500 tons, the value of which was in the neighbourhood of $18 per ton. All of this ore came from abandoned workings in the mine above the fifth level, and as no development work was carried on, the value of the shipments left the lessee with a good margin of profit after paying all charges.

ATHABASCA-VENUS COMPANY.

The properties which make up the *Athabasca* and *Venus Groups* were operated throughout the year by the re-organised Canadian Company, which succeeded the old Athabasca and Venus Companies. During the greater part of the year the work was restricted to the development of the *Venus* property, from which, approximately, 7,000 tons of ore were mined, while upwards of 2,500 feet of development were performed. The development consists of driving a series of four tunnels. Work has also been started on a fifth tunnel, which will have a length of 1,300 feet before it reaches the boundary of the company's property, and a depth of 800 feet on the vein. Respecting the ore reserves, the management reports that with the commencement of the year 1904 there was more ore in sight in the mine than at any former period in its development, the reserves being estimated at 8,000 tons; and from the appearance of the vein it is estimated that there is an ore tonnage of 35,000 tons ahead of the five levels.

On the *Athabasca* property there was an ore extraction of 800 tons during the year. This came largely from pillars in the old working, the ore being extracted on a tribute system, and from the No. 2 east drift. This was the lowest working in the property, and the new company has made a connection to the surface by means of a shaft and upraise, the former having been sunk by the old management. The drift itself has also been advanced 200 feet and has developed an ore body with a length of about 300 feet and a "back" of approximately 150 feet. It is the intention of the management to sink on this ore body to a depth of 200 feet. Work in the *Athabasca* has been restricted to this portion of the property, as the vein appears to be much more regular than in the other workings.

Of the general result of the year's operations the manager, A. H. Gracey, stated that the same had been profitable, and had enabled the company to put a considerable amount into development, and the close of the year found sufficient ore blocked out to keep the ten-stamp mill running for eighteen months. Milling operations were not commenced until the latter part of November, and the report prepared by the company included some milling which was done during the previous December. This showed that 7,325 tons of *Venus* ore and 935 tons of *Athabasca* ore had been milled, from which the values saved were $92,000.

May and Jennie. This property, which is situated on 49-Creek, is connected with Nelson by means of a waggon road, and was systematically developed by the owners throughout the year. Arrangements have been perfected for the organisation of a company to take over the property; this plan calls for the erection of a mill capable of treating 100 tons per day. Much of the work preliminary to the erection of the mill has already been done. The property is equipped with good boarding and bunk-houses, a flume 2 by 2 has been constructed for three-quarters of a mile, and is connected with a steel pipe-line 800 feet long to the mill-site, giving a pressure of 480 feet, and a retaining wall and foundation has been laid for the mill. The work done in the mine has resulted in proving up above the No. 2 level some 60,000 tons of ore carrying good commercial values.

The underground work on the property consists of the No. 1 adit, which has been run in for 80 feet, and gives a depth of 125 feet on the vein at the face. There have been 575 feet of drifting on this level, which has shown the ledge to vary in width from 5 to 24 feet, and to carry ore of payable values.

The No. 2 adit has been advanced some 375 feet, the ledge being struck 350 feet in from the portal. Drifting has been carried on north and south from this level along the ledge, the former drift being 400 feet long and the latter 250 feet. There has also been considerable cross-cutting, the work disclosing large bodies of ore. Connection has also been made between the two levels by means of a 112-foot upraise, and a second upraise 97 feet in length connects with the surface.

Extensive surface work was also done on the *Red Top* claim of this group, the wash being cut for a depth of 30 feet. This work uncovered two ledges, one having a width of 9 feet and the other a width of 20 feet, both carrying good gold values.

Extensive tests have been made of the *May and Jennie* ore, both as regards milling and cyaniding, and the installation of a mill is all that is required to enable the property to commence producing.

Gold Hill and Silver Crown.

This property is situated about two miles above the *May and Jennie Group*, and is now sufficiently developed to warrant a company with the necessary capital taking it over. The work consists of a 600-foot cross-cut, which intercepts the ledge at a depth of 300 feet. At the point where the ledge was cut in the tunnel it was drifted upon for 50 feet, and a shaft was also sunk 35 feet. The ledge, so far as it has been developed, shows a uniform width of 3 feet and carries quartz in much of which the gold shows free. From tests made of the ledge it has been shown that the entire 3 feet carries approximately $25 in free gold values to the ton and about 1 % in copper, and from 2 to 3 ounces silver. The owners made two test shipments to the Nelson smelter of five tons each. The first represented the entire ledge matter and yielded smelter returns of $25 to the ton in gold. The second shipment was made up of sorted ore and gave returns of $80 to the ton. The ground in this property is said to be very easy to work, and arrangements are being made under which it is expected the property will be operated during the approaching summer.

Poorman and Granite.

These properties were operated by the Duncan-United Mines during the greater portion of the year, during which time development was carried forward on the three levels. The company suspended operations in October, for the reason that the margin of profit was not sufficiently large to justify operations upon a 20-stamp mill basis. It is said that work will be resumed during the coming summer. From January till October the company mined 14,000 tons of ore, and from this were sorted 9,170 tons which went to the company's mill. This yielded 2,339 ounces gold, and 231 tons of concentrates. The shrinkage in values in the ore more than offset all economies effected in management, with the result that operations were suspended.

Juno Group. This property, which lies immediately above the *Venus*, is owned and operated by the Juno Mines, Limited, the head office of which is in Montreal, and the local manager of which is M. S. Logan. There are two veins on the group, upon which work has been done consisting of an 800-foot adit and a 300-foot shaft, from which a 200-foot drift has been run. Of the adit tunnel the first 300 feet of it was run in on what is known as the *Venus* ledge, from which point it was swung over so that it would strike the bottom of the shaft which had been sunk higher up the hill on the *Juno* vein. Connection was established between the adit and the shaft. The work done has demonstrated the fact that the *Juno* vein has an average width of 4½ feet, and tests made from the ore give it an average value of $13 or $14 to the ton in free gold. Of the *Venus* vein, which runs into the *Juno*, all the work being done on the former is proving up the ledge for the *Juno* owners. The No. 2 tunnel of the *Venus* has already reached the *Juno* line at a point 400 feet below the adit tunnel of the latter. In this portion of the vein the values disclosed in the *Venus* ore were $12.50 to the ton in free gold. A crew of 15 men was employed on the property during the year.

Fern Mine. This property, situate on Hall creek, was operated under lease by E. Rammelmeyer during the whole of 1903, during which period 300 feet of new ground was opened up beyond the old workings, with very satisfactory results, exposing a ledge varying from 2 to 3 feet in width and carrying high-grade milling ore. The property was equipped with a mill at the time the lease was taken on it, but the mill was in bad repair and it was not until the close of the summer that it was in shape to run, so that after satisfactory tests, operations were deferred until the following spring. The close of the year, according to the estimate of the lessee, saw 20,000 tons of ore blocked out in the mine, of which he estimated 5,000 tons would mill at $10, and the remainder from this figure down to $3. The lessee expects to make a very good showing with the *Fern* during the approaching summer.

Ymir Mine. The *Ymir* mine was operated during the entire year under the management which came in with the reconstruction of the company, but, so far as can be learned, the results were hardly such as can be regarded as satisfactory. The ore tonnage milled during the year was 54,850 tons, a slight increase over that treated during the year 1902, but the values recovered were smaller than those of the previous year. The values resulting from the milling and cyaniding were 11,160 ounces gold, 50,060 ounces silver, and 515 tons of lead, which with the concentrates brought the total product up to something over $300,000, a falling off of $45,000 from the previous year's record.

There was considerable development carried on along the fourth, fifth and sixth levels of the mine, and some new chutes of ore were opened up, but the changes made in the management at the close of the year made it impossible to secure details as to the results of the development. Speaking generally, however, it is said that where the drifts have been carried east the prospect of striking payable ore in the 1,000-foot cross-cut on the tenth level has been very much brightened. This is the hope of the management, and the realisation of it would make the *Ymir* the most valuable mining property in the district.

Note by the Provincial Mineralogist.—The Ymir Gold Mines, Ltd., during the year 1903, was under the management of Mr. R. M. Atwater, who retired on the last day of the year and was succeeded by Mr. G. H. Burnhart, who was formerly, under the old company, the mine and mill manager, but who is now in general charge. The Ymir mine has recently installed a cyanide plant for the treatment of tailings from the stamp-mill. The following notes are extracted from a paper, by E. C. Holden, read before the American Institute of Mining Engineers, and give an idea of the cost of installing and operating the plant:—

The stamp-mill contains sixteen 5-stamp batteries; stamps, 850 lbs.; drop, 6½ inches, about 98 to 100 times a minute; the height of issue is from 3½ to 5 inches; narrow mortars; screens No. 9 and 11, diagonal slot; crushing capacity, from 2½ to 3 tons per stamp in 24 hours. The ore is white, massive quartz, containing from 8 to 12 % of sulphurets, the latter being pyrite, sphalerite and galena.

The saving on the plates was 61.9 % of gold values and 9.4 % of silver. Plate tailings from 10 stamps were fed to 3 Frue vanners. The saving in the concentrates was:—Gold, 16 %; silver, 35.4 %; lead, 42 %; the total saving of the stamp-mill was thus 77.9 % gold and 44.8 % silver.

The cyanide plant has been built about half a mile from the mill and at about 300 feet lower elevation, the site for it having to be cleared in a heavily wooded section. All the plant is housed, the buildings being heavily timbered, as necessitated by the deep snowfalls.

The vanner tailings are carried to the plant by a box launder, 6 x 8 inches in section' with drop boxes. The tailings enter the top of the storage solution room and are "classified" in two boxes. From the last box 60 % of the water and 20 % of the tailings, all of which would pass a 100-mesh screen, is run to waste.

All vats and tanks are of steel; the leachers are 32 feet in diameter and 6 feet deep, on timber foundations; the sumps are wood; the distributers are of the usual type and have twenty 1½-inch arms.

The classification of values in charges and overflows was marked, the average assays and screen tests for the year being:—

	Gold, oz. per ton.	Silver, oz. per ton.	Through a 100 mesh screen.
Vanner tails	0.0838	1.008	64.86 %
Charges	0 0931	0.637	50.70 "
Overflows	0.0621	1.878	98.90 "

The high silver in the overflows is due to its association with galena in the slimes.

With all the stamps dropping, a tank was filled in from 28 to 32 hours; a normal charge was 185 tons dry weight. Routine treatment was as follows:—

After levelling and adding dry lime ($\frac{1}{10}$th lb. to ton charge), two 5-ton doses of weak solution (between 0.1 and 0.05 % KCN) are successively given, followed by four or five 10-ton doses of strong solution (0.2 % KCN) at 5-hour intervals. The charge is drained for 6 hours, then 20 tons of strong solution are run in under the filter and false bottom.

The total time of treatment of a charge was 9½ to 11½ days. Residues are discharged through two 10-inch plug-flanges by sluicing with a 2½-inch hose under 115 lbs. pressure. One man will sluice out the residue of a charge and clean the filter in 4 hours.

The filter is three thicknesses of 16-oz. burlap, having the usual false bottom and rope-grouting. Precipitation from the cyanide solution is effected by zinc shavings in eight 10-compartment steel boxes.

Operating costs per ton for the last quarter, when 7,150 tons were treated, were as follows:—

Cost of Treatment per Ton.

Cyanide at 22 cents per ℔	$ 0.200
Zinc „ 9 „ „	0.020
Lime „ .009 „ „	0.001
Fuel „ $2.50 a cord	0.019
Clean up supplies	0.029
Repairs	0.014
Miscellaneous	0.003
Labour (wages $3.50 to $4.50 per day)	0.234
Total	$ 0.520

Assay costs were not allocated, but the cyanide plant proportion should approximate $0.025 per day. These results were obtained when treating but 78 tons a day. This cost can be reduced to 38.6 cents when the plant is treating its full rated capacity of 200 tons per day.

The plant is equipped with steam heating and electric lighting plants, and has an auxiliary water power system capable of developing 300 h.-p. The pumps and lighting dynamo are run by Pelton water motors under 320-ft. head, and the only cost of power is the trifling item of maintenance of flumes.

The total cost of the works, including the power plant, was $57,951.63. Omitting the costs of the main mill building, boarding-houses, power plant and heating system, thus reducing the estimate to the basis of an "open air plant," the cost was $33,782, including the clearing, excavating and masonry, which amounted to $6,321.34.

Dundee. This property, situate on Dundee mountain, in the vicinity of Ymir, received some attention during the year. It has been idle for a considerable period, but some Coast people opened negotiations with the owners, which led to the pumping out of the mine and the working of a small crew of men for some time. This work is being done under the superintendence of A. H. Gracey, and may result in a resumption of operations on this property, on which a number of the prominent mining engineers of the district have from time to time made most favourable reports as to the ore reserves.

Wilcox. This property, situate on Wild Horse creek, is owned and operated by the Broken Hill Mining & Development Company. The past year marked the first run of the company's stamp-mill on a commercial scale. The mill commenced operations on May 1st, and for the six months following made a very successful run, the total product of the mine from the mill and shipments of crude ore in the period being $22,000. As the property is favourably situated for working, the net result was a substantial earning for the company, but the greater portion of it went into improvements in the mine. For the entire year the output of the mine was 2,200 tons milled and 100 tons of high-grade ore which was shipped to the smelter in the crude state. The work accomplished during the year consisted of 300 feet of drifting and stoping on the first and second levels of the *Fourth of July* vein, and 200 feet of tunnel work on development account. The company also intends to continue work in the upper tunnel on the *Wilcox* vein. This tunnel is in 400 feet, and it is estimated a 200-foot cross-cut will tap the *Fourth of July* vein at an additional depth of 400 feet below the present workings.

Foghorn.

The results of development on this property are regarded as the most encouraging of the year. For a number of years the owners of the property have been engaged in driving a long cross-cut to tap a vein from which high values were taken. The beginning of 1903 found this cross-cut in 900 feet, and before the year's end it was advanced another 300 feet. In its course it has intercepted two veins which have been deemed worthy of attention. The first of these is known as the No. 2 vein, and was crossed 800 feet in from the portal of the tunnel; upon it a drift has been run for 125 feet. The other vein has been called the No. 3, and is believed to be that to cut which the tunnel was run. Where the vein has been cut in the cross-cut it has a width of 6 feet, and an average sampling of the vein at this point is said to give an indicated value of $10 to the ton. This value, taking into account the fact that the vein has been developed for a depth of 900 feet, gives a most important bearing to the Foghorn development.

Hunter V.

The development on this property during the year has fully justified the predictions of its promoters. As has been explained, it is an immense deposit of lime which carries pay values in gold and silver. The nature of the deposit permits the mining of it by the cheapest methods, that is quarrying and chambering. The lime contents of the ore render it valuable to the smelters for fluxing purposes, so that advantageous smelting rates have been secured by the owners.

The work done during the year consisted of an incline shaft 120 feet, 100 feet of open surface work on the *Hunter V.*, and something over 400 feet of work on the *Double Standard* claim, in the same group. To move the ore to the railway a double rope aerial tramway of 13,000 feet, and two subsidiary tramways of 1,800 and 500 feet have been built, while living accommodation for 75 men has been put up. The production during the year was restricted to 400 tons, but with the end of 1903 the company was in shape to maintain an output of 100 tons per day, and by the end of June, 1904, it is the intention to increase the output to 400 tons per day.

Gold Cup.

This property, which is situate about four miles north of the town of Ymir, was under development throughout the year by Messrs. Wolfe and Davault. It is a gold proposition and has been opened up to a depth of 100 feet, with very gratifying results, the vein having an average width of 4½ feet and sampling $15 in gold with small values in copper and silver. The holders of the *Gold Cup* option took in an experimental mill during the summer. This has but two stamps, but arrangements have been made for increasing the battery to ten stamps, as they have sufficient confidence in their ore reserves to warrant this.

On the *Arlington* and *Second Relief* properties work was carried on for a considerable period during the year, the shipments reported from the former being about 1,300 tons; and from the latter nearly 1,500 tons. Of the other properties in the vicinity of Erie the only ones appearing on the shipping list were the *Canadian King* and *Keystone.* These were worked in a small way under lease, the shipments from the former being about 100 tons, and from the latter some 250 tons.

NOTE BY THE PROVINCIAL MINERALOGIST.—The following information is condensed from a report on the *Lucky Strike Group.*

The *Lucky Strike Group*, consisting of four claims, two of which are Crown-granted, is situated on Midge creek, about twelve miles by trail from navigation or railway transportation and some 10 miles north-east of the *Ymir.* The surface showings are exceedingly good and there are five well-defined veins on the property, the croppings consisting of a porous quartz with limonite, galena, pyrites and silver sulphurets.

The principal development has been on No. 1 vein, the largest of the five mentioned, which has a width of from 15 to 45 feet. The work consists of 13 surface cuts, exposing the lead for 800 feet along its course, a cross-cut tunnel of 100 feet and one of 87 feet, a winze and a drift. The former tunnel (No. 1) intersects the vein at a depth from the surface of 70 feet on the dip, and assays on samples from this working run from $1.75 to $12 in gold and from 60 cents to $8 in silver, while assays on samples from the second tunnel (No. 2), which intersects the vein at a depth of 50 feet, and from the winze and drift, which latter has been driven 200 feet north on the lead, run from $4 to $26 in gold and from $2 to $7.25 in silver, while section samples from a rich streak in the middle of the vein in the drift run from $18.25 to $32 in gold and from $6 to $12 in silver. On No. 2 vein development consists of a drift (42 feet) and cross-cut; the mineralisation is in lead oxides and chlorides and assays give also good gold values. No. 3 vein, 40 inches in width, has a small shaft and open cut, and No. 4 vein, about 150 feet east of No. 3, has been developed by six open cuts; assays from these veins give good gold values and up to 13 % lead. On No. 5 vein open cuts are being made.

The total development on the property is: 67 feet of shaft; 187 feet of cross-cut tunnels; 241 feet of drifts; 25 open cuts. There are besides a log bunk-house for 16 men, cook-house, dining-room, store-house, blacksmith's shop, etc., and a water-pipe line of 2,700 feet has been laid for domestic purposes, the value of improvements being about $10,000.

GOAT RIVER MINING DIVISION.

With regard to the Goat River Mining Division there is little to report during the past year. By an Order in Council dated November 10th, 1903, the territory embraced in this Division was merged in the Nelson Mining Division, and the boundaries of the latter Division extended to include the Goat River Mining Division, a Sub-Recorder being appointed with office at Creston, B. C. This Order in Council took effect on the 31st December, 1903,

In the Summit Creek camp there are reported to be some promising new locations. Among the properties in this camp may be mentioned the *Bayonne Group*, referred to in last year's Report, and on which a considerable amount of work has been done, the *Red Horse*, *Granite*, *Lone Star* and *Black Watch*.

The *Silver Hill*, situated on Crawford creek, is stated to have shipped some ore during the year, under a lease.

Alice.

The *Alice*, in the vicinity of Creston, which has been idle for a number of years, has been secured under lease by Mr. John Hampson, who has previously had much to do with the development of the property. There have been upwards of 2,000 feet of work done on the *Alice*, and there are on the dump between 800 and 900 tons of ore which will yield from 25 to 30 ounces silver and high percentages of lead. A depth of 250 feet has been attained on the vein, which has an average width of two feet. The lease on the property is for ten years and the lessee has perfected arrangements for the erection of a concentrator capable of handling 50 tons of ore per day. The concentrator will be connected with the mine by means of a tramway, upon which work was commenced late in the year. It is estimated that there is sufficient ore in sight on the *Alice* to keep the mill running for two years.

With regard to the discoveries of iron ore, further finds have been reported from Gray creek, a distance of 30 miles from the Kitchener deposits. On the Kitchener deposits themselves no work has been done during the year.

ARROW LAKE MINING DIVISION.

REPORT OF WALTER SCOTT, MINING RECORDER.

I have the honour to submit my annual report on the Arrow Lake Mining Division for the year ending December 31st, 1903.

The *Empress*, *Delanger*, *Anna S.*, *Maple Leaf*, *Ontario*, *Forest Chief* and *Monarch* claims, located on the "Big Ledge" on Pingston creek, were inspected recently by interested parties, who are reported to have offered $20,000 for a half interest, an offer which the owners declined. The vein has a width of 30 feet and the mineralisation is largely zinc. Sixteen claims are recorded upon this same ledge and three have been Crown-granted.

The *Meadow Group* of mineral claims, situated on the headwaters of Mineral creek, consists of the *Skylark*, *Shakespeare*, *Boita* and *Meadow Queen*. The claims have been grouped and a considerable amount of work done upon the *Meadow*, a shaft being sunk for 30 feet. There is a quantity of shipping ore on the dump.

On the *Millie Mack* mineral claim, situated on Cariboo creek, there is a large quantity of ore on the dump, and the owner intends shipping next season.

On the *Paladora Group*, consisting of the *Paladora*, *Meadow View No. 2*, *Reward* and *Cornwall No. 2*, situated near the headwaters of Fire Valley creek, considerable work has been done this season and the claims are showing up well, the assay values running $15 to $30 in gold per ton. This section of the country is attracting a good deal of attention.

The *Cornwall Group* consists of the *Cornwall*, *Devonshire*, *Ophir*, *Cascade* and *Pearl* claims, situated near Cape Horn, Upper Arrow lake, about half a mile from the shore. The annual assessment work was done on the *Cornwall*, where there is a large showing of low-grade copper ore assaying 8 % copper and $2 gold per ton.

The *Chieftain Group* consists of the *Chieftain*, *Duchess*, *Dundas*, *Mammoth No. 2* and *Silver Tip No. 2*, situated on Cariboo creek. These properties have all been Crown-granted. On the *Chieftain* a tunnel has been driven 200 feet, the vein showing up strongly and carrying native silver. A large quantity of shipping ore is on the dump and assays $200 silver per ton.

OFFICE STATISTICS—ARROW LAKE MINING DIVISION.

Number of mineral claims recorded	18
Certificates of work issued	18
Certificates of improvements recorded	14
Bills of sale, etc., recorded	10
Free miners' certificates issued	63
Special free miners' "	1

ROSSLAND DISTRICT.

TRAIL CREEK MINING DIVISION.

Report of J. Kirkup, Gold Commissioner.

I have the honour to submit my report of mining operations in the Trail Creek Mining Division during the year 1903.

Concentration of Ores.

Apart from the ordinary detail of the year's work which is here given, some experiments which have been conducted for the better reduction of Rossland's ores have been carried to what might be called a successful finish during the past year. In consequence of this, several plants, of varying nature, have been completed, or are under way, and the year to come will probably see a revolution in the treatment of the ores of this camp, the initial stages of which have been witnessed during 1903.

Of these experiments perhaps the most important, at all events the most advanced, is the "Elmore" process for the concentration of the values in the silicious ores, and while it would be well to refer to the whole of these various methods, yet, in a sense, the "Elmore" is a key to all. The Elmore Oil Process is applied chiefly to the reduction of silicious ores of low grade having a greater or smaller percentage of copper and low values in gold. It will also treat lead ores, and is more or less suitable to ores which are not base. The typical mill is that which has been erected upon the property of the Le Roi No. 2 in this camp. It is a combination of the water process and of oil.

(Note by the Provincial Mineralogist.—The description of the Elmore Oil Process furnished by the Gold Commissioner has been amplified by information kindly supplied by Mr. H. Hayman Claudet, the technical representative of the Canadian Oil Concentration, Ltd., the company holding the Canadian rights to the process.)

The Elmore Oil Process, as worked at the Le Roi No. 2 Plant at Rossland.

The mill is so situated that ore from either the Le Roi No. 2 mine or from the dump can be trammed direct into it. The ore is first fed into a Blake crusher, in which it is crushed to about 4 inches in size. From this it goes to a Gates crusher and is reduced from ½-inch to ¾-inch, in which size it goes into the ore bin, which holds a sufficient supply to last over night. From the ore bin the ore is fed by Challenge automatic feeders into two 6-foot Trent mills (Chilian), in which it is pulverised to the desired mesh. Up to the present time the mesh used has been No. 40, but to a certain extent this is a matter of experiment as yet, and naturally would vary with different ores. From the Trent mills the pulp passes through automatic samplers and thence on to two Wilfley tables, by which the coarser and cleaner, and therefore the heavier, particles of mineral are separated out. The tailings from the Wilfleys, which consist of the gangue matter, together with particles of mineral not entirely freed from gangue or in too fine a state to have been readily caught by the Wilfleys, then pass on to be treated by the Elmore Process proper.

As will be seen, the process up to this point is the ordinary water concentration, and the oil process is employed simply as an adjunct to this, to treat the tailings from the former method and from them to make a saving of what would otherwise be a waste product.

The tailings from the two Wilfleys, having already passed a 40-mesh screen, are run on to two units of an "Elmore Oil Plant." (One unit = an estimated capacity of 25 tons per day.) These "tailings" are fed into "mixing cylinders" with water and oil from the storage tanks. These mixers, of which there are three, are long iron cylinders, placed horizontally and provided with inside baffle plates, which, as the cylinder is revolved at a low rate of speed by power, thoroughly mix the charge, bringing the oil into contact with every particle of mineral in the tailings. The oil, for some reason not explained, has the faculty of catching up and retaining fine particles of sulphides and of free gold. From the mixers the charge is flushed with water into settling tanks. Here the gangue matter settles to the bottom, while the oil, being lighter than the water, floats on the surface, retaining with it the metallic sulphides, etc. The oil can only carry a limited amount of sulphides to an extent such as will not render the oil-mineral compound heavier than the water.

The first settler-tailings (gangue matter, with such sulphides as may have escaped the first mixer) are run with the water into a second mixer, with the addition of more oil, and a second separation is similarly made in a second settler. The second settler tailings are usually fairly clean, but are run through a third mixer and settler. From this last the tailings go to the dump through an outside settling tank, in which is collected any oil which may have escaped.

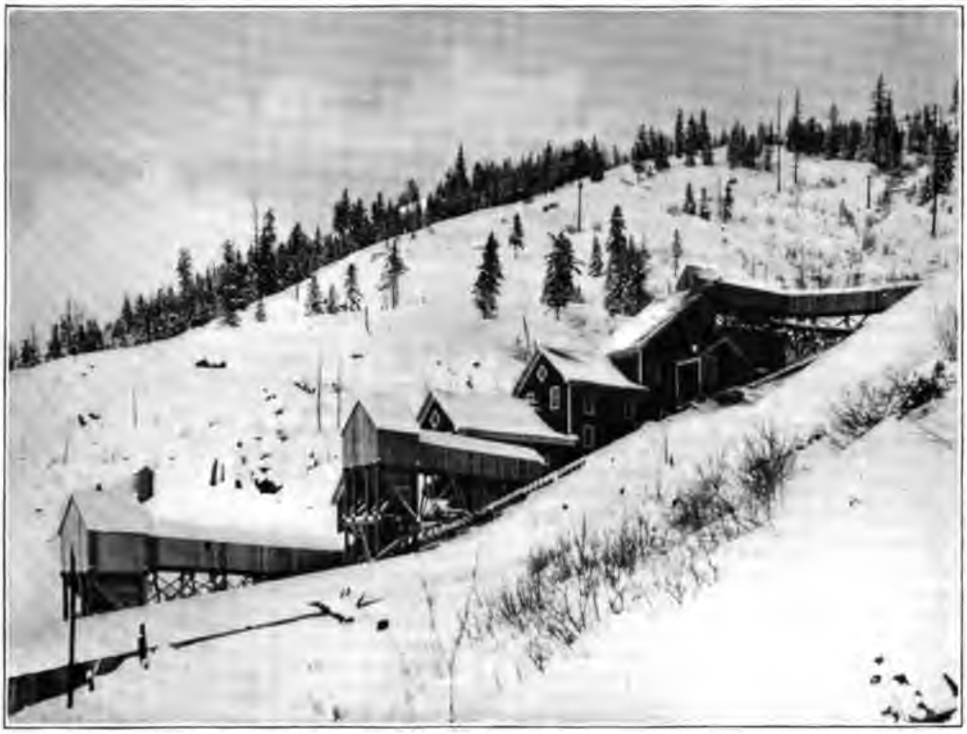
The mineral-charged oil and any surplus oil is run off from the surface of the various settlers into the first "oil extractor," which is a centrifugal machine, 4 feet in diameter with solid walls, revolving at a speed of 1,000 revolutions a minute, in which any surplus oil is washed out by water and flows over into an oil-settling tank, from which it goes back eventually to the storage tanks on the higher level.

After all the surplus oil has been washed out, the water is run off and the "oil concentrates" are discharged and carried by a worm conveyor to a second extractor at a lower level. This second extractor is a centrifugal with perforated screen side, and here a steam jet is introduced, which renders the oil more fluid and at the same time assists in the removal of a further quantity of it, "drying" the concentrates somewhat. All oil not absorbed by the concentrates is returned to the process to be used over again. The concentrates, both from the Wilfley tables and the oil process, are sent to the smelter.

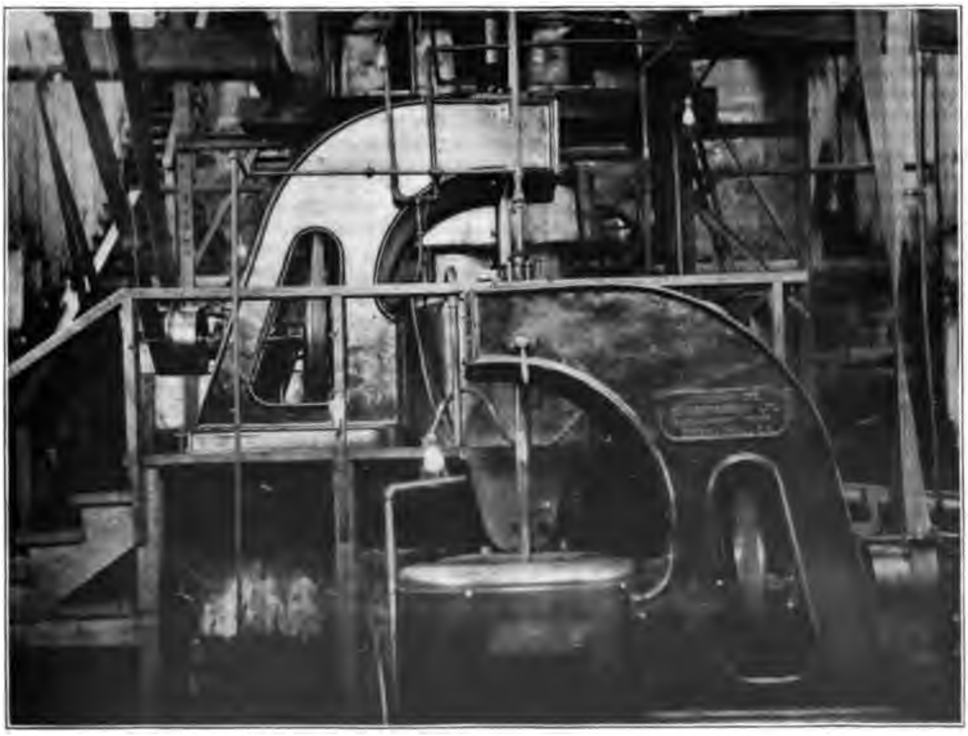
Mr. Claudet says: "The cost of installing such a plant will, of course, depend on the location to a certain degree, as well as on the style of crushing machinery which is installed. The oil plant itself costs, approximately, $6,000, to which must be added the cost of the building to contain it and the erection. The power required to drive a 50-ton oil plant is about 10 H.P. The water required is from six to ten times the amount of ore treated; or, to take an average, for every ton of ore about 8 tons of water would be required. The consumption of oil varies with the nature of the ore which is treated, but it may be taken as ranging from one to one and one-half gallons per ton of ore treated. In the LeRoi No. 2 mill, up to now, they have only treated low grade ore, viz. between $4.50 and $5 ore. The ratio of concentration has been on the average about 13 to 1. From ore of this value they are obtaining concentrates from the Wilfley tables of about $50 and oil concentrates of about $40, and the tailings will run a little over $1 per ton. By finer crushing, together with one or two modifications, we shall be able to reduce the value in the tailings even lower than this.

"The great feature of the oil process is that it saves the finest slimes without any trouble; while very good work is done by the Wilfley tables on the comparatively coarse material, the finest particles of values which escape the tables are readily picked up by the oil.

"With regard to the applicability of the process, one might say that, with very few exceptions, all sulphides are amenable to the oil treatment; on the other hand, oxides are not.



LE ROI No. 2 COMPANY'S MILL–ELMORE OIL PROCESS–ROSSLAND.



INTERIOR VIEW, SHOWING SEPARATORS.

It is also essential for close work that the sulphides should have a fresh surface, as the oil seems to take up any brightened surface better than a tarnished one.

"The cost of treatment will depend of course on the size of the plant, as well as on the local conditions; but, for the guidance of anyone in this Province, I think it is near enough to say that for a plant on a large scale, say of 200 or 300 tons capacity per day, the total cost, including loss of oil and the royalty, would come to about $1.25 per ton of ore treated; while for a small plant, say of 50 tons a day, the total cost would probably be in the neighbourhood of $2 per ton. At present the cost of treatment in the LeRoi No. 2 plant has exceeded this last figure; but then, it must be remembered that up to now there have been stoppages and delays, due to the large amount of snow we have had, as well as to unavoidable delays in starting up a new plant, which have interfered with the continuous running essential to any mill.

"I consider that eventually we shall have a very large field on copper ores, which slime considerably when crushing. There are plenty of these ore bodies in this Province too low grade to smelt and yet impossible to concentrate by water. Also, I believe we shall have a field anywhere where there are already existing water concentrators, which are losing a lot of values in the slime running away in the tailings,"

These are the main conditions of the process, and it may be stated that the mill is run by electricity, of which there is a cheap supply in the camp.

Below the mill described is to be erected another of a larger size by the White Bear Company, and probably a third, below that of the *White Bear* but within a few hundred yards of the first, will be built by the *Spitzee*. It may be said that the details of this work have not as yet been thoroughly elaborated, and further orders of similar machinery are but awaiting this being accomplished.

In the mines of the Rossland camp, even including those mines which are generally classed as silicious, many kinds of ore are found. It will at once be apparent that heavy pyrrhotite requires different treatment to silicious quartz. Also, as is not generally known, there is a variable quantity, occurring irregularly, of free-milling gold in the base ledges.

As may have been gathered from these remarks, the Elmore process, however eminently suitable to the treatment of the silicious ores of the camp, cannot in the very nature of concentration touch the ferruginous. And yet the ferruginous ores of Rossland are considered to be quite as plentiful as the silicious, and some method of treating these cheaply must be found if the lower grades are to be treated successfully. For the heavy pyrrhotite ore smelting is sufficiently economical, but for the low-grade iron ore, running between four and eight dollars per ton, of which there is plenty in the camp, notably on the north-eastern side of the crater, as well as occurring plentifully in the south belt, smelting is far too expensive.

As these ores often run from 40 to 80 % iron, it will be seen that concentration, which only gets rid of the silica in the form of mud, but saves all the metallic particles, is absolutely useless. Pyritic smelting has been suggested and the sublimation process, but according to recent experiments on the Rossland-Kootenay ores, the process which is popularly known as the "Hendryx," but which is really an adaptation of the electro-cyanide, will be adopted some time during the coming year.

In detail the Hendryx mill commences its treatment process much as does the Elmore plant at the Le Roi No. 2. There are the ordinary crushers, through which the crushed ore is fed to Chilian mills. Here, instead of water, a weak solution of cyanide is introduced, coming from a storage tank above. The pulp flows into the storage tanks where the surplus cyanide solution is drawn off and returned above. The pulp is then let into the only part of the plant which can possibly be called "Hendryx"; this is the agitator, and in this the oxidisation is set up. Before cyanide will act upon the precious metals oxygen must be taken up. This is supplied by the atmosphere, and usually is introduced by means of compressed air; it takes some considerable time to thoroughly permeate the pulp. Moreover, there is a thermal action set up which tends to separate nitrogen and oxygen in the air, causing the formation of nitrous compounds which give trouble. This agitator, which practically makes the electro-cyanide process available for Rossland ores, acts in a different manner. Inside the agitator is a cylinder, and inside the cylinder are a series of paddles which elevate the pulp in the path of a spiral to the top, where it falls in a thin stream over a flat surface back over the sides of the cylinder to the bottom of the agitator, whence it is again lifted up. The cyanide, during its exposure, absorbs oxygen from the atmosphere; hence the process takes a few hours instead of days, thus making a small mill do the work of a larger one. After the lapse of sufficient time the solution is decanted into a tank below, the pulp squeezed dry by hydraulic pressure, forming the tailings. The cyanide solution contains the whole of the gold and the small proportion of the copper present in the ores. The iron and sulphur goes untouched into the tailings, and electrolysis then precipitates the metallic contents upon a silver plate. The cyanide solution is then regenerated by electric power, only about 4 % of cyanide being lost, which is added. The Hendryx process does not as yet recover copper, though Hendryx says he is hopeful of accomplishing this eventually.

A third method for reducing the low-grade ores of the camp, namely, pyritic smelting, has been the subject of much investigation during the year. To this investigation attention was recently called, in a general way, at the annual meeting of the Rossland-Kootenay Mines held in London in December. As a result of these experiments, it has been decided by the Chairman of the Velvet-Rossland Mine, Ltd., to erect a small pyritic stack on or near the *Velvet* property, probably on Big Sheep creek, at the foot of Sophie mountain. This is to be run in conjunction with a concentrator which will be set up upon the property itself. The concentrator is planned to be of the water type, and is calculated to save about 80 % of the values. The concentrates from the mill will be used in the pyritic smelter in order to bring up the value of the matte. The matte will be in the form of a concentrate of about 25 to 1.

DESCRIPTION OF MILLING PLANT AND METHOD OF TREATMENT OF THE ROSSLAND POWER COMPANY, LIMITED.

The plant of this company is now in course of construction at a point about three-quarters of a mile north of Smelter Junction, on the line of the Canadian Pacific Railway from Rossland to Nelson. It is being built primarily for treating the lower grades of ore from the *War Eagle* and *Centre Star* mines, but will probably handle more or less custom ore as well, when the capacity has been raised to allow of it without interfering with the output of the two mines mentioned. The initial capacity of the mill will be 200 tons per 24 hours, but it is being so arranged that, by duplicating certain machines, the capacity can be greatly increased—possibly doubled—without adding to the buildings now under construction.

The essential feature of the process used is a thorough water concentration, with gradual reduction to prevent the formation of rich slimes, a preliminary coarse crushing and concentration permitting of the removal of a considerable percentage of the sulphide contents as a product for smelting. The tailings will then be ground and separated into sands and slimes, each of which will be given a special treatment for the recovery of the remaining values.

The location of the works and the arrangement of the plant are such as to afford an almost automatic handling of the material from the time it enters from the railway cars as crude ore until it is discharged into the railway cars as concentrates, the tailings going to the waste dump. The plant is of the "level site" type, as distinguished from the usual side-hill type. It is believed that this is the first mill of this type of construction to be built in British Columbia. The water supply, which is necessarily a large one, is from Stoney, Rock and Murphy creeks, whence it will be conveyed by flume to a point on the north side of the first-named stream, and thence to the mill by a steel pipe-line. The waste water and tailings will be discharged to the large sandy flat opposite the mill. The motive power will be electricity from the system of the West Kootenay Power and Light Company, Limited. The equipment of motors will be a little less than 500 H. P. It is expected that the plant will be ready for starting some time during the spring. When operations commence and the mill is running to its full capacity, from 40 to 60 men will probably be employed. The estimated cost of the plant is $150,000.

The ore shipments from the Trail Creek District for 1903 were, approximately, as follows:—

Le Roi	184,151	dry tons.
Centre Star	82,257	"
War Eagle	60,093	"
Le Roi No. 2	16,000	"
Rossland-Kootenay	7,500	"
Jumbo	4,200	"
Velvet	4,000	"
I. X. L	1,389	"
Giant	660	"
Spitzee	483	"
White Bear	150	"
Miscellaneous	150	"
Total	360,408	"

The gross value of this ore is estimated at $4,289,857. The difference between dry and wet tonnage is about 2 %.

DETAILED STATEMENT.

Le Roi Mining Company, Limited.—Le Roi Mine.

Tons of ore shipped	184,151	
Average number of men employed	324	
Underground	240	
Surface	84	
Development:		
Shafting	140	feet.
Driving	3,799	"
Raising	588	"
Cross-cutting	2,465	"
Winzing	69	"
Diamond drilling	6,123	"

There were no additions to the plant during the year.

NOTE BY THE PROVINCIAL MINERALOGIST.—In the report to their shareholders, the directors of the LeRoi mine state:—"The operations of the year resulted, as shown in the accounts, in a profit of £80,242, arrived at after writing off £32,015 in respect of development, and £19,148 for depreciation of plant, machinery, buildings, etc., at the mine and smelter. It will be seen from the report that during the year under review, 172,669 dry tons of ore were mined and shipped to the Northport smelter, the gross value amounting to $2,307,069, equal to $13.36 per ton. In addition, the ore shipped from the dump to Northport amounted to 7,195 tons, with a gross value of $80,368, equal to $11.17 per ton."

Mr. S. D. Parrish, general manager of the company, says:—

"*Ore Production, etc.*—The ore mined and shipped to Northport during the year amounted to 172,669.259 dry tons, its metal values averaging: Gold, .443 oz.; silver, .6 oz.; copper, 1.655 per cent. per ton. Its gross value was $2,307,069.70, equal to $13.36 per ton. Mining operations were carried on continuously during the year—the only stoppages which occurred being on "shift" Sundays and public holidays. The second class ore shipped to Northport during the year amounted to 7,195.69 tons. It contained average metal values of gold, .368 oz.; silver, .53 oz. per ton, and copper, 1.27 %. As the average value of ore mined during the year was equal to $13.36 per ton, and the entire operating expenses for the same period $11.370 per ton, a profit of $1.999 is shown to have been made on the first-class ore, equal to $343,611.82. The gross value of the second-class ore shipped being $11.177 per ton, and the total expense of handling and treating same $6.34 per ton, the profit assumed to have been made on this ore is, therefore, $4.837 per ton, or $34,809.30.

"*Working Costs.*—The books show that our operating expenses, which embrace mining, freighting of ore, smelting and realisation of matte values, were equal to $11.370 per ton during the year. The subjoined table gives the comparative costs under this head for the years 1901, 1902 and 1903:—

	Per ton, 1901.	Per ton, 1902.	Per ton, 1903.
Stoping and loading on railroad	$3.487	$3.100	$2.715
Exploration	.423	.451	.899
Depreciation:			
Mine equipment	.080	.138	.081
Surface improvements	.050	.061	.064
Mine machinery	.106	.125	.144
Pearl and Ruby claims and sundries	....	....	.011
Freight on ore to smelter	.510	.400	.367
Smelter expense	4.465	4.205	4.319
Depreciation of smelter plant	232	.119	.208
Interest and discount on ore in yard and matte in transit	.229	.233	.375
Freight on matte to refiners	.536	.404	.440
Sacking and crushing matte	.044	.043	.054
Eastern representation, assaying, etc	.028	.013	.022
Penalty for low copper	....	....	.091
Refiners' tolls	.534	.579	.741
Metal losses in smelting	....	.781	.839
Totals	$10.724	$10.652	$11.370

"During the year the sum of $149,601.57 was expended on the development of the mine. The details of the work performed and of costs are as follows:—

Work.	Footage.	Cost.	Cost per ft.
Combination shaft	90	$9,763 57	$108 48
Peyton shaft	50	1,417 20	30 34
Station cutting		2,766 59	
Pocket cutting		1,639 62	
Raising	588½	13,874 98	23 57
Winzing	69	2,563 85	37 15
Cross-cutting	2,453	34,529 49	14 07
Drifting	3,799	57,056 07	15 01
Prospecting		45 88	
Open cuts		135 25	
Diamond drill station (1,200)		185 31	
Diamond drill station (1,350)		130 43	
Peyton tunnel and open cuts		4,753 44	
Peyton tunnel cross-cut	12	215 90	17 99
Diamond drilling	6,123½	20,423 99	3 33
Totals	13,185	$149,601 57	

"*General Remarks:*—The profit made during the year, after making the very liberal allowances previously referred to, amounts to $366,309.11. To this should be added the sum of $68,487.01, which represents the amount realised from the ore stocks and furnace bottoms on hand at June 20th, 1902, over and above the valuation placed upon them at that date. The difference between the sum gained in mining the first-class ore and the total profit of the year is made up of the earnings of the smelter in the treatment of 'custom ores.'

"The matte shipped during the year was 5,823,362 tons, of a nett value of $2,332,393.11, equal to $400.52 per ton. The ores smelted amounted to 187,232.64 tons, of which 36,115.958 tons were purchased."

Le Roi No. 2, Limited—Le Roi No. 2 Mine.

Tons of ore shipped (dry)	16,000
Average number of men employed	104
Underground	74
Surface	30
Development:	
Driving	2,070 feet.
Raising	18 "
Cross-cutting	300 "
Tunnelling	110 "

The additions to plant during the year are valued at $45,000.

Centre Star Mining Company, Limited—Centre Star Mine.

Tons of ore shipped (dry)	82,257
Average number of men employed	133
Underground	114
Surface	19
Development:	
Raising	230 feet.
Winzing	79 "
Drifting Cross-cutting	1,844 "

The value of the mining plant, machinery, buildings, etc., is given at $204,482.22.

NOTE BY PROVINCIAL MINERALOGIST.—The Centre Star mine is one among a few in the Province which publish, or allow to be published, the details of cost of operating. The reports of the management of this property are, in this matter, so admirably gotten out that they are reproduced here, not only as illustrating the costs of mining in the Rossland District, but as examples of the form in which such statements are made.

The following is taken from Mr. Kirby's report to the Directors, at the annual meeting of the Centre Star Mining Co. held November 24th, 1903, for the fiscal year ending September 30th, 1903:—

"Developments up to date show that the Centre Star mine has experienced the same general change in the character of its ore deposits which has occurred in all other productive mines in the Rossland District, and which is the general rule throughout the mining districts of the world. This is the transition from the occurrence of high grade bonanza ore bodies, capable of profit under the expensive process of smelting, to masses of lower grade, requiring a cheaper treatment by milling.

"As the bodies of smelting ore in the vein become less frequent and their average size diminishes, the proportion of this ore to the increasing quantity of development or dead work required to expose it rapidly lessens to a point where its profit is consumed by the cost of the dead work. The relief to be derived from milling will, therefore, be not only in the direct saving of cost expected, but also in the increased proportion of pay ore to development work, while the stoping of low-grade blocks will assist the exploration work by disclosing the unknown bodies of smelting ore contained within their limits.

"The ore sales during the year have been 88,387 tons, averaging $10.58, smelter's gross assay value. The average assay contents were: gold, 0.50 oz., silver, 0.40 oz., copper, 0.99 %. The net profit in excess of all expenditures was $228,358.90, which has covered the indebtedness of the company and left a surplus of $88,157.12 in the treasury. The reserves of smelting ore at the present moment are not large, and are of such shape that their dimensions cannot be accurately estimated.

"The development work of the year has continued to add to the great masses of ore too low in grade for smelting, but rich enough to afford a profit to successful milling. Now that the mill of the Rossland Power Company assures an outlet for these ores in a few months, their contents will soon be available. It is impossible to present any reliable estimate of their quantity or precise value, because their limits have not been defined, and until milling begins they cannot be exposed or sampled accurately without excessive expense. They occur in extensive bodies 15 to 30 feet in width, and exposed very imperfectly by the mine workings, since these have been in the past directed to the exposure of smelting ore bodies only."

The following details of development work done are condensed from the report:—

4th level, 431 feet deep (measured on vein), extended to point 690 feet from shaft.
5th " 608 feet deep; extended to point 358 feet from shaft cross-cut.
6th " 778 " " " " 1,060 " "
7th " 924 " " " " 615 " "
8th W. level, 1,077 " " " " 285 " "
E. " " " 425 " "
9th level, 1,222 " " " " 109 " "

The report states that besides certain bodies of ore of smelting grade, considerable bodies of lower grade ore were encountered, which averaged roughly from $4 to $8 in "smelter's gross values," and further remarks: "The necessity for milling has long been foreseen, but although every effort has been made towards the desired end, there has been unexpected delay, owing to unusual difficulties and obstacles. The technical problem presented by the nature of the ore has been a serious one, and the business arrangements necessary for success have also taken time.

CENTRE STAR MINE.

Comparative Statement of Work Done and Its Costs, General Expenses Included, Per Foot or Ton, to September 30th, 1903.

	Oct. 1, 1899, to Sept. 30, 1900.			Oct. 1, 1900, to Sept. 30, 1901.			Oct. 1, 1901, to Sept. 30, 1902.			Oct. 1, 1902, to Sept. 30, 1903.		
	Work Done. Feet or Tons.	Total Cost.	Cost per Foot or Ton.	Work Done. Feet or Tons.	Total Cost.	Cost per Foot or Ton	Work Done. Feet or Tons.	Total Cost.	Cost per Foot or Ton	Work Done. Feet or Tons.	Total Cost.	Cost per Foot or Ton
Development Work:—												
General work, stations, re-timbering, machinery and equipment repairs, maintenance, etc.		$15,216 59			$15,663 36			$13,517 06			$3,057 62	
Sinking main shaft	228.5	28,250 81	$123 63	337.	33,415 68	$99 16	362.	34,445 82	$95 15			
Sinking small shafts or winzes	103.5	6,107 39	59 01	50.5	2,268 93	44 93	50.5	2,283 67	45 22	79.	3,062 47	$38 77
Raising	903.5	50,606 61	56 01	324.5	10,099 31	31 12	153.	5,081 80	33 21	186.	5,577 48	29 97
Drifting	2,421.	64,942 85	26 82	2,107.	42,927 22	20 37	3,997.5	87,664 29	21 93	2,903.5	49,621 49	17 09
Total development work	3,656.5	165,124 25		2,819.	104,374 50		4,563.	142,992 64		3,168.5	61,319 06	
Ore Production:—												
Ore from development work sold—tons	4,034.94			4,522.			1,018.			3,934.		
Ore from dumps, storage, etc., sold—tons				7,774.	2,291 80	0 29						
Stoped ore sold—tons	20,489.95	73,591 27	3 59	68,123.	151,682 93	2 23	10,069.	29,559 82	2 93	84,453.	174,425 78	2 07
Total ore sold	24,524.89	73,591 27	3 00	80,419.	153,974 73	1 91	11,087.	29,559 82	2 67	88,387.	174,425 78	1 97
Summary:—												
Expense of development, per ton of ore sold	24,524.89	165,124 25	6 73	80,419.	104,374 50	1 30	11,087.	142,992 64	12 89	88,387.	61,319 06	70
Expense of production, per ton of ore sold	24,524.89	73,591 27	3 00	80,419.	153,974 73	1 91	11,087.	29,559 82	2 67	88,387.	174,425 78	1 97
Total expenditure, per ton of ore sold	24,524.89	$238,715 52	$9 73	80,419.	$258,349 23	$3 21	11,087.	$172,552 46	$15 56	88,387.	$235,744 84	$2 67

CENTRE STAR MINE.

TOTAL HEADINGS OF CENTRE STAR MINE, SEPTEMBER 30TH, 1903.

	Sinking Main Shaft.	Sinking Winzes.	Raising.	Drifting.
	Feet.	Feet.	Feet.	Feet.
Total headings of mine, September 30th, 1902	1,289.5	1,693.5	1,994.5	15,286.5
Advance of headings, October 1st, 1902, to Sept. 30th, 1903	....	79.	186.	2,903.5
Total headings of mine, September 30th, 1903	1,289.5	1,772.5	2,180.5	18,190.

TABLE OF MINE COSTS—TWELVE MONTHS ENDING SEPTEMBER 30TH, 1903.

	Development Work.				Ore Extraction.
	Sinking Main Shaft.	Sinking Small Shafts.	Raising.	Drifting.	
Total advance, feet	....	79.	186.	2,903.5	....
Ore stoped, tons	....	....	....	....	84,453.
	Cost per foot.	Cost per foot.	Cost per foot.	Cost per foot.	Cost per ton.
1. Drilling	....	$6 10	$7 31	$4 53	40.5
2. Blasting	....	2 48	2 40	1 08	03
3. Explosives	....	3 13	3 72	2 72	14.5
4. General mine supplies	....	51	64	43	04
5. Mine lighting—candles	....	26	19	14	01.5
6. 〃 electric	....	30	22	13	01
7. Smithing	....	1 00	1 14	72	06.5
8. Tramming and shovelling—direct	....	5 51	65	1 21	24
9. 〃 〃 apportioned	....	64	35	42	08.5
10. Timbering—labour	....	1 81	3 08	02	19
11. 〃 material	....	33	57	01	11
12. Machine drill fittings and repairs	....	86	94	60	05.5
13. General mine labour	....	1 57	1 18	84	09
14. Hoisting—underground	....	4 79	....	....	....
15. 〃 main shaft	....	1 48	89	94	19
16. Compressed air	....	1 74	2 08	1 07	12
17. Mine ventilation	....	23	17	13	01.5
18. Pumping	....	1 71	1 09	34	03.5
19. Assaying	....	55	47	14	03
20. Surveying	....	20	17	11	01
21. General expense	....	3 57	2 71	1 51	18.5
Total	....	38 77	29 97	17 09	2 06.5

ORE SOLD.

Stoped	84,453 tons.
Met in development	3,934 〃
Total	88,387 〃

War Eagle Consolidated Mining and Development Company, Limited—War Eagle Mine.

Tons of ore shipped (dry)	60,093
Average number of men employed	121
Underground	103
Surface	18
Development:	
Raising	125 feet.
Winzing	23 "
Cross-cutting	328 "
Drifting	797 "

The value of the mining plant, machinery and buildings is given at $165,000. There were no additions during the year.

Note by the Provincial Mineralogist.—The *War Eagle* mine is under the same management as the *Centre Star*. The following is taken from the annual report of the manager:—

"The ore sales during the year have been 60,039 tons, averaging $13 full assay value, or $9.87 smelter's gross assay value. The average assay contents were:—Gold, 0.418 oz.; silver, 1.02 oz.; copper, 1.45 %. As shown by the profit and loss statement, the net profit for the year was $30,340.47, which, with the amount charged off for the depreciation of plant, etc., $38,171.74, shows an excess of revenue over expenditure of $68,512.21. The present reserves of smelting pay-ore are estimated at $20,000 tons, averaging $10 smelter's gross assay value.

"A preliminary mill of 200 tons daily capacity, but designed for prompt enlargement to 400 tons, is now being built by the Rossland Power Co., Ltd., and is located upon the line of the Canadian Pacific, near the town of Trail. It is expected to begin operations by early spring, affording the desired outlet for the milling ores of the *War Eagle* and *Centre Star* mines.

"An examination of the cost sheet will show that the costs per foot for raises and drifts have been brought to lower figures than hitherto, while the stoping cost has been kept down approximately to the minimum record. The width, shape and distribution of the *War Eagle* smelting ore bodies are not so favourable for cheap stoping as those of the *Centre Star* vein, so that even with the same skill and economy the minimum cost figure is necessarily higher than that of the *Centre Star* vein.

The mine produced 60,093 tons of ore during 1903, of a real or full assay value of $13 per ton. The smelter net value of this ore, f. o. b. cars at the mine, was $5.31. The expense of production was $2.82 per ton. Development cost 44 cents per ton of ore shipped. The following charges are made per foot:—Drilling, $17.06; winzing, $30.70; raising, $26.29; stoping, $2.90.

"Since 1894, during which year the mine shipped 48 tons, the *War Eagle* has produced 240,465 tons of ore, worth $5,152,109.11."

Rossland Kootenay Mining Company, Limited—Nickel Plate and Kootenay Mines.

Tons of ore shipped (dry)	7,500
Average number of men employed	45
Underground	35
Surface	10

Development—*Kootenay*:	
Driving	25 feet.
Raising	30 "
Cross-cutting	39 "
Tunnelling	457 "
Winzing	210 "
Development—*Nickel Plate*:	
Driving	403 "
Raising	41 "
Cross-cutting	198 "

The Jumbo Gold Mining Company, Limited—The Jumbo Mine.

Tons of ore shipped (dry)	4,200
Average number of men employed	21
Development:	
Cross-cutting	70 feet.
Tunnelling	100 "
Winzing	15 "

There were no additions to the plant during the year.

The Consolidated White Bear Mining Company, Limited—White Bear Mine.

Tons of ore shipped (dry)	150
Average number of men employed	17
Development:	
Shafting	248 "
Driving	1,400 "

The additions to the plant during the year amounted to about $40,000.

The Spitzee Gold Mines, Limited—The Spitzee Mine.

Tons of ore shipped (dry)	483
Average number of men employed	15
Development:	
Shafting	120 feet.
Driving	160 "
Raising	80 "
Cross-cutting	130 "

The additions to the plant during the year amounted to about $8,000.

No accurate account can be given as to the *Velvet* mine, owing to suspension of work and change of management, together with the taking away of the books and accounts to the head office in London. The approximate tonnage is shown.

The *Giant* also gives no definite information, from reasons which are very similar to those applying in the case of the *Velvet*.

Outside of the companies whose work is here set forth in detail, little has been done in the camp beyond the ordinary assessment work, with a notable exception of some gold recovered from the dumps of the *I. X. L.* Work, however, on this property, has stopped, at all events for the present.

Beyond this there have been made several inquiries, by various owners of smaller properties now lying idle, as to the Elmore process. The demonstrated success of this method of reducing silicious ores will probably lead to work being resumed by some of the inquirers.

Outside of the camp proper some work has been accomplished during the year upon the *Jessie F.* property upon Norway mountain, and also upon the *Inland Empire*, also in the Norway mountain section of this Division, but situated upon Grenville mountain.

OFFICE STATISTICS—TRAIL CREEK DIVISION.

Mineral claims recorded	64
Certificates of work recorded	136
Payments in lieu of work	2
Certificates of improvement	14
Bills of sale, etc., recorded	24
Water grants issued	6
Free miners' certificates issued :	
Companies	15
Personal	466
Substitute, personal	1
Special "	11

BOUNDARY DISTRICT.

GREENWOOD MINING DIVISION.

REPORT OF W. G. McMYNN, GOLD COMMISSIONER.

I have the honour to submit my annual report of operations in the Greenwood Mining Division during the year 1903.

The Boundary country during 1903 has made substantial progress in development, both in output of ore and in the opening up of new properties. The mines already shipping are making efforts to increase their production to the highest possible figure, which their immense bodies of ore permit to be easily done, and in consequence the smelters of the district are encouraged to increase their capacity. This, notwithstanding the fact that operations were necessarily suspended for nearly two months during the coal strike, has drawn the attention of investors more than ever to Southern British Columbia, and the prospects for the coming year are of the best.

GREENWOOD CAMP.

Granby Company.

This camp naturally takes the first place on account of the Granby Consolidated Mining, Smelting & Power Company's properties, of which the principal are the *Knob Hill* and *Ironsides* claims. This company has raised its output of ore to about 2,000 tons per day, and at the same time is actively engaged in opening up new workings underground. In this way, during 1903, 4,386 lineal feet of underground work was done, consisting of 1,743 feet of raising, 110 feet of sinking, and 2,533 feet of cross-cutting and drifting, but the bulk of the 394,448 tons of ore shipped to the company's smelter at Grand Forks was taken from the quarries on the *Knob Hill*. To handle this quantity of ore the company has installed an enormous plant, using principally electricity for motive power around the mine, and steam shovels and locomotives in the quarries. The electric current is supplied by the Cascade Power & Light Co., whose power-house is at Cascade, 30 miles from Phœnix. As the object is to reduce the cost of production as much as possible, the company has four tunnels connecting with shafts and upraises at 325, 425, 525 and 700 feet depth, through which the ore is trammed to the ore bins on the railway sidings. No. 4 tunnel will be 900 feet long when completed and will connect with the 300-foot level on the *Old Ironsides* claim. Two compound duplex tandem air compressors, having a capacity of 8,228 feet of free air per minute (equal to 60 drills), and two 700 horse-power Westinghouse induction motors of 2,000 volts, 3 phase, 7,200 alternations per minute, speed 290 revolutions per minute, to operate same, have been installed, besides two steam shovels, one of 750 cubic yards per 10 hours capacity and one of 1,500 cubic yards per 10 hours capacity, and two 9-inch by 14-inch saddle tank locomotives, hauling capacity 80 tons each, for loading and hauling ore. In prospecting and testing the ore bodies, 4,150 feet of diamond drill work has been done. A new compressor building 121 by 60 feet, and new ore-bins of 3,500 tons capacity, were added during the year. The work done in 1903 has raised the total of underground work to 19,208 feet and the total quantity of ore shipped to a little over 1,000,000 tons.

Brooklyn and Stemwinder. These properties have been at a standstill during 1903, but there is evidence that a move is soon to be made in shipping ore, as spurs are being constructed connecting with the C. & W. Railway. The development already done is sufficient to make this mine a shipper of ore at once, should the owners (the Dominion Copper Co., Ltd.) decide to open it up, there being two shafts on these claims, one of 270 feet and the other of 340 feet depth, and cross-cutting of about 4,000 lineal feet.

The *Nellie Cotton* and *Mystic* claims have been recently bonded to Spokane parties, and it is expected that work will be resumed in 1904.

DEADWOOD CAMP.

Mother Lode Group. The *Mother Lode Group* of claims, owned by the British Columbia Copper Co., has been the most active producer in this camp. Following the practice of the district where large bodies of ore occur, these properties have been of late mostly opened up by means of quarries, there being now four of these on the *Mother Lode* and *Primrose* claims. The ore from the upper quarries is trammed to a railway spur immediately below, and from the lower quarries is dumped through shafts into the lower tunnel, whence it is hauled to a lower spur. In this manner about 1,600,000 cubic feet of ore have been extracted, and, in development work, about 250,000 cubic feet of stripping done, while underground 310 feet of upraising and sinking and 1,090 feet of cross-cutting was performed. There was shipped to the company's smelter at Greenwood a total of 137,000 tons of ore during 1903, making the aggregate shipments to date 381,000 tons. There were added to the plant at the mine a general shop, extra stable accommodation, three cottages for employees, and a dam and pond for water purposes. To meet the added increase in shipping, a second Jenckes crusher of large size, with driving machinery, will be erected, while large skips for raising ore will be installed in the shaft. As most of the ore shipped in 1903 was from the quarries, this improvement was necessary, as in 1904 underground stoping will be resumed.

Sunset and Crown Silver. The development of these properties, the principal ones of the group of claims owned by the Montreal & Boston Copper Co., was not systematically pushed during 1903, as the company's smelter at Boundary Falls was generally stocked with custom ores; nevertheless, 100 feet of sinking and 500 feet of cross-cutting and drifting was done underground. The quarry on this property represents 175,000 cubic feet of rock removed, and altogether 16,000 tons of ore were shipped, leaving still 10,000 tons on the dump and in bins ready for shipment. The company's smelter at Boundary Falls was closed down in November, and since then no ore has been shipped. It is expected, however, that during 1904 drifting will be resumed from the 400-foot level on the *Sunset*.

Morrison. Very little work has been done lately on this claim, the property of the Morrison Mines, Ltd., compared with what had been carried out in previous years; of the total of 3,735 feet of development only 241 feet of cross-cutting was performed in 1903. At the station in the tunnel connecting with the upper and lower workings, 19,200 cubic feet of rock were removed and prospecting to the amount of 1,040 feet done with the diamond drill. As there is no railway communication nearer than a mile and a half, the ore shipped had to be hauled that distance by waggon to a siding, and in this manner between two and three thousand tons were shipped, of which 2,404 tons went to the smelter at Greenwood and the balance to Grand Forks and Trail. In the future only shipping of ore already on the dump or in the stopes, of which there is 1,100 tons, will be attempted, until better railway facilities are secured.

The McRae Copper Mines, owning the *Ah There*, *Greyhound*, &c., did a little work in the summer of 1903, but only a trial shipment of 27 tons was sent to the smelters. These properties are at present shut down. On the *Buckhorn*, *Marguerite* and *Great Hopes* nothing was done, and on several other properties only assessment work was performed.

Copper Camp lies west of and adjoins Deadwood Camp. There are a number of valuable claims here, but nothing of consequence has been done since 1902, when about 1,000 tons were shipped from the *King Solomon*, and a move was made to get the *Copper Mine* (commonly known as the *Big Copper*) put on a shipping basis.

In Central Camp is the *No. 7 Group*, owned by the No. 7 Mining Company of New York. Nothing of importance was done in 1903, and from the *No. 7*, the principal claim on which extensive development work has been done, only 66 tons of ore were shipped. There is no railway nearer to this camp than Boundary Falls, and the waggon road is not only of heavy grade, but is liable to damage from water soakage and washouts.

On the *Ruby* claim, in Smith's Camp, a force of men has been at work since the fall of 1903, and a drift is being pushed in to cut the ore body. This property is under bond to local parties.

LONG LAKE CAMP.

Roderick Dhu. This property was bonded in the summer of 1903 to a local syndicate' and since that time, in addition to a considerable amount of surface work to prove the strength of the ledge and the necessary underground work to get out a few trial shipments of ore, a waggon road was constructed to the top of the mountain. The result obtained from the smelter returns was of sufficient importance to encourage the lessees to continue development, and during 1904 work on this high-grade property will be continued.

Ethiopia. Very little was done on this property, but towards the end of the year work was resumed, and five tons of high grade ore were sent to the Montreal & Boston Copper Co.'s smelter at Boundary Falls.

The success met with on these properties, in addition to the *Jewel* (on which, however, nothing was done in 1903), has given a stimulus to this camp which has been wanting for some years, and it is to be expected that very early in 1904 more claims will be taken up and developed.

PROVIDENCE CAMP.

Providence. One of the most gratifying results of quartz mining in southern British Columbia during 1903 has been the ensured success of the small but rich ledges found on many of the mineral claims surrounding Greenwood. These had been neglected for the larger bodies, so common in the district, for many years, until Mr. Fowler bonded the *Providence* and shipped 26 tons of ore, which netted him $4,898.33, free of all charges, or nearly $200 per ton. This property was soon afterward acquired by the Providence Mining Company, a local concern, which has persistently developed it, and has put it on a sound financial and shipping basis. Last year 702 tons of ore were shipped, which realised almost exactly $100 per ton, free of all charges. The development consists of two shafts, connected by cross-cuts and upraises, one of 180 feet depth and one of 64 feet depth. Altogether, about 1,098 feet of underground work has been done. The company installed a small steam plant for hoisting and pumping, lighted the mine and surface workings with electricity, and built the usual mine buildings necessary. These improvements, and the cost of the property, have been nearly all met by the proceeds derived from the ore extracted, and the shareholders have received two dividends of 10 cents per share each. This is one of the first companies in the Boundary to pay a dividend.

Elkhorn.

This claim almost adjoins the *Providence* and has had practically the same success. After several futile attempts by various parties to find the ore, this property was finally acquired by Messrs. Sutherland & Macdonald, who commenced shipping small trial shipments to the smelters. The character of ore is much similar to that met with in the *Providence* and nets about the same values. There is an incline shaft of 180 feet depth and cross-cuts at the 80 and 140-foot levels, the depth attained by the lowest of these being 300 feet from the surface. It is known that the purchasers have paid for the mine and development with the ore taken out, and work is being vigourously prosecuted to increase the output during 1904.

E Pluribus Unum Group.

This group is commonly called the *E. P. U.* and comprises the claim of that name, the *Marjorie*, *Lancashire Fraction* and *E. P. U. Fraction*. This property has had the same phenomenal success as the *Providence* and *Elkhorn*, with similar character of ore and values. Since it was taken over by Mr. D. W. McVicar and associates, a main shaft has been sunk 85 feet deep, with drifts at the 60 and 85-foot levels of a total length of 150 feet, and solid quartz carrying high values, estimated at $125 per ton, is met in both cases. A large amount of stripping has been done on the surface and the existence of the ledge for at least 350 feet has been proved. The average value of the 104 tons of ore shipped was $105 per ton, gross. During 1903 a horse-power hoist was installed and an ore-house built. The owners have also built a gravity tramway, to enable them to get out their ore more economically, and during 1904 it is expected that greater progress will be made than heretofore, as there is a large body of ore ready for stoping. The work at present on hand of extending a level from a point 85 feet north of the shaft, will give a depth of 125 feet where the ore is met.

On the *Goldfinch* in 1903, a shaft was sunk 100 feet, 100 feet of drifting done, and about 900 cubic feet of ore stoped. This claim adjoins the *E. P. U.* and was soon taken over by the same owner. The level is being carried south and will be at a depth of 160 feet from the surface when the ore is met. Twenty-two tons of ore were sent to the B. C. Copper Co.'s smelter at Greenwood and 5 tons to the smelter at Nelson, from which similar values were obtained as from the *E. P. U.* ore.

On the *Helen*, *Barbara*, *Strathmore*, *Fremont*, *Coronation*, *Combination*, *Abercraig*, *Defiance* and *Gold Bug* claims work is at present being done, or had been done during 1903, but no reliable account of results can be at present obtained.

SKYLARK CAMP.

This camp has been in a backward state for the last two years, but during 1903 work was done on several properties, with a view to shipping if the ore could be encountered in sufficient quantity and of sufficient value. On the *Don Pedro*, *Dandy*, *Dynamo* and *Trilby*, the owners or lessees have spent a considerable sum in development, meeting with encouraging results. Work will be resumed on all of these properties in the spring of 1904. On the *Dandy* a total of 120 feet of tunnel work was done, which proved up a well-defined ledge 15 inches wide, of quartz and galena, with assay values in gold and silver of $15 per ton. Of this ore there are 8 tons on the dump, but the lessees were unable to prosecute the work further.

On the *Trilby* over $1,000 was expended, while on the *Dynamo* work is still going on in the shaft.

From this camp was shipped the first ore from the Boundary country, when the *Skylark* was in operation, but as it had to be packed on horses and, a little later, hauled in waggons to Marcus, a distance of 90 miles, and thence by rail to Everett, it was too expensive and the mine was shut down awaiting more favourable conditions. On both the *Crescent* and *Lake* there is an extensive plant, and a large amount of development work has been done, but nothing of importance has been attempted for nearly two years.

MAIN KETTLE RIVER AND CANYON CREEK.

Riverside. The only property on which more than assessment work has been done in this neighbourhood is the *Riverside*, near James creek. This claim is owned by Mr. Ben. Perkins and was under bond to outside parties in 1902. They did a considerable amount of development and installed a small working plant, but, after nine months, they failed to take up the bond. The owner started work himself at a lower level, and after running about 50 feet encountered a strong ledge, which assayed over $200 in gold and silver values. Work is now being done to stope this ore during the winter, as, on account of the situation of the mine, this is the only time shipping can be successfully and cheaply done until the Kettle river is bridged or a waggon road constructed down the east side of the stream. The total amount of work done underground is 530 feet.

WEST FORK OF KETTLE RIVER.

Development work on all properties in this neighbourhood has again been handicapped on account of the non-completion of the waggon road from Westbridge to Beaverdell and Carmi, but with the advent of winter it is hoped that shipments will be made. This is especially the case with the *Butcher Boy*, on which, during 1903, further sinking of 75 feet and drifting of 85 feet was done on the *Standard*, *Bounty*, *Sally* and several other claims. On the *Sally* stoping is at present being done, while on the *Standard* and *Rambler* ore has been ready for two years. As the Vernon & Midway Railway has commenced preparations for building a road through this country, it is now only a question of time until this area of valuable mineral land is opened up. From the *Butcher Boy* 3½ tons of ore were shipped to the Greenwood smelter, for the first 40 miles by waggon, and there are 30 tons now ready. This ore realised about $60 per ton.

CAMP MCKINNEY.

Cariboo Group. After operating this mine for the last ten years, during which time about $350,000 dollars were paid in dividends, the directors decided to close it down last November, on account of the values being too low to earn much more than expenses. This decision, it is hoped, is only temporary, but nothing will be definitely known until after the annual meeting of the company in February, 1904.

Waterloo. The owners of this claim, the Waterloo Consolidated Mining and Milling Co., have settled down in good earnest to make this property a steady producer of ore, the financial troubles having been settled and a stamp-mill and other improvements necessary for turning out bullion installed. It is reported that during 1903 enough gold was saved to pay for these improvements, besides the cost of development. The ore has been proved to be in place at the lowest depths attained, and is said to be of good value, but reliable figures are not available. The company, however, has a good force of men steadily at work, and it is to be hoped that this property will take the place of the *Cariboo*, which was so long the mainstay of the camp.

The owners of the *Dayton Group*, where the finding of large quantities of free gold created so much excitement a year ago, after first bonding it and then receiving it back again, have decided to open it up themselves and a shipment of ore is now being got ready. A small force of men is kept at work.

Nothing of importance was done on the other claims in the camp. It is expected that an amalgamation may be effected between the *Waterloo* and *Fontenoy*, which adjoin and have probably the same ledges.

On Rock creek a small amount of placer mining is still being done by whites and Chinese. Of the 25 placer leases taken up about two years ago, all have now been cancelled, but some new ones are being applied for.

THE BRITISH COLUMBIA COPPER COMPANY'S SMELTER AT GREENWOOD.

Extensive additions were made to the plant at this smelter during 1903, and at present a steel-framed converter, 45 by 90 by 38 feet inside, is being built. A new brick smokestack 122 feet high, 12 feet diameter; a brick sub-station for the Cascade Power and Light Co., which is to supply electric current for motive power; excavations for converter foundations, with retaining walls and foundations for buildings and machinery, were finished before the end of the year. The transformer house will connect with the sub-station at Phœnix by a pole-line five miles long, and the equipment will be of 1,000 horse-power capacity, with Westinghouse step-down transformer from 20,000 to 2,000 volts, and all other necessary appliances. The converter power-house will be 81 by 40 feet, and will be equipped with the latest machinery suitable for electric or steam power, although the former will be used. The converter will, for the present, have five converter shells, 84 inches diameter and 126 inches long, each supplied with 14 tuyeres with ball valves and a 40-ton four-motor travelling crane, with 5-ton matte ladles, on a 40-foot span, 26 feet above the floor level. The whole plant is arranged for a downward movement of all material that has to pass through it. An additional spur from the main line of the C. & W. Ry. has been constructed through the smelter yard to a level 4 feet 6 inches below the converter floor, to facilitate loading the copper turned out. The change from granulating the slag to hot dumping necessitated the building of a trestle railway and the purchase of a Baldwin locomotive and six 5-ton side-dumping slag cars. The following is a summary of the tonnage of ore smelted and values obtained, with the source of the various ores treated at this smelter:—

1903—Month ending	Tons Smelted.	lbs. Matte made.	lbs. Copper.	oz. Silver.	oz. Gold.
January	12,078	597,800	292,411	2,715.87	682.12
February	6,432	334,100	152,732	1,288.60	355.78
March	.....	.....	.....	.....	.....
April	.....	.....	.....	.....	.....
May	21,470	866,000	413,020	6,181.60	1,083.70
June	21,060	866,000	423,678	4,922.30	1,038.17
July	18,080	834,000	391,832	5,211.40	1,079.23
August	17,969	863,200	368,895	3,754.76	990.91
September	18,635	726,000	358,918	3,595.90	892.21
October	13,846	742,000	333,822	8,227.00	1,554.63
November	18,238	919,048	391,812	12,217.20	2,592.32
December	15,646	646,720	294,605	8,605.72	2,090.04
Totals	163,454	7,394,868	3,421,725	56,720.35	12,359.11

GROSS VALUE OF PRODUCT AT AVERAGE NEW YORK QUOTATIONS FOR 1903.

Copper	3,421,725 lbs.	@ 13.235	$452,865 30
Silver	56,720.35 oz.	@ 53.45	30,317 02
Gold	12,359.11 oz.	@ $20 00	247,182 20
			$730,364 52

SOURCES OF ORE SMELTED.

Mine.	Tons.
Mother Lode	137,816
Snowshoe	12,417
Emma	2,255
Le Roi No. 2 (Rossland)	5,722
Morrison	2,404
B. C.	1,442
Athelstan	426
Winnipeg	315
Oro Denoro	284
Elkhorn	145
No. 7	66
Providence	90
None Such	19
Ah There	27
Gold Finch	22
Roderick Dhu	2
Helen	2
Total	163,454

THE MONTREAL AND BOSTON COPPER COMPANY'S SMELTER AT BOUNDARY FALLS.

The same progressive spirit was manifested at this smelter as at the two others in the district. One extra furnace was erected and another is on the ground ready for building. These are all 40 by 176 inches inside tuyere line, and have each a nominal capacity of 300 tons per diem. A locomotive and a number of 5-ton slag cars for dumping hot slag were installed, the change here from the granulating process being also found necessary. Altogether, over $60,000 was expended in improvements during the year 1903, before the smelter closed down. Following is a summary of the output during 1903:—

1903—Month.	Tons Smelted.	lbs. Matte made.	Copper Value.	Silver Value.	Gold Value.
January	7,997	719,010	$43,929 51	$3,602 06	$8,627 58
February	7,883	635,816	37,938 59	3,257 76	8,667 48
March	3,000	282,489	16,419 62	1,216 89	2,536 02
April	....	....	....	....	....
May	7,276	735,259	38,172 45	3,015 16	6,421 46
June	9,323	813,740	42,317 58	3,171 11	9,248 24
July	12,607	609,651	34,725 49	5,267 18	13,597 14
August	14,857	510,490	30,597 24	2,807 00	16,420 12
September	16,270	575,049	31,610 94	3,963 15	31,086 60
October	15,691	676,500	26,000 00	3,115 00	31,600 00
November	11,977	380,700	17,400 00	1,655 00	18,820 00
December	3,200	188,900	8,200 00	800 00	9,000 00
Totals	110,081	6,127,604	$327,311 42	$31,870 31	$156,024 64

SOURCES OF ORE SMELTED.

Mine.	Tons.
Snowshoe	61,593
Oro Denoro	13,440
B. C.	12,843
Providence	225
Elkhorn	81
Winnipeg	1,645
Senator	15
Ethiopia	5
Strathmore	2
Mountain Lion (Trout Lake)	1,682
Jackpot	218
Sunset	14,110
Athelstan	4,008
Quilp	213
Total	110,080

OFFICE STATISTICS—GREENWOOD MINING DIVISION.

Free miners' certificates	699
Location records	369
Certificates of work records	635
Abandonment records	5
Conveyance records	165
Certificates of improvements issued	88
Placer location records	5

GRAND FORKS MINING DIVISION.

REPORT OF S. R. ALMOND, GOLD COMMISSIONER.

I have the honour to submit my report of progress made in the mining industry in the Grand Forks Mining Division for the year 1903.

The season has, in many ways, been brighter than the foregoing one of 1902. In the spring of this year (1903), quiet, though persevering, inquiries were being made for promising mineral claims, with the result that, towards the close of the season, several good properties were being worked under bond.

Very little money was expended on public works during the year in this division, but, though small in amount, it was utilised to the best advantage.

Granby Smelter. The Granby Consolidated Mining, Smelting and Power Company's works have undergone noteworthy additions and improvements during the year, for information relating to which I am indebted to Mr. H. N. Galer, assistant general manager, viz.:—Two new water-jacket blast furnaces were put in, bringing the total up to six furnaces, with a capacity of 2,000 tons per day, and three standard Connersville blowers with three 100 horse-power Westinghouse electric motors; two Canadian Rand Drill Co.'s locomotives and fifteen 6-ton slag-cars, the slag now being dumped hot instead of being granulated; machine and blacksmith shops, as well as the furnace and blower rooms, enlarged. Arrangements for extra electrical power and light have been made with the Cascade Water Power and Light Co., a brick sub-station having been built at the smelter and equipped with the necessary apparatus, a double-circuit, three-phase line connecting with the main transmission line between Cascade and Phœnix. The estimate of ore smelted during the year is 399,062 tons, and the computation of the copper produced is 16,932,156 pounds.

The supply of coke has been a difficulty, and the shortage resulted in a curtailment of smelting operations. The company, it is stated, intends to obtain its fuel in future from certain coal mines being opened up in Alberta by the International Coal and Coke Co.

Volcanic Group.

The Volcanic Mining and Development Company, of Marquette, Michigan, holds under bond the following claims in Brown's Camp:—The *Volcanic* and *Fantantine* from R. A. Brown; the *Superior* and *Dabney* from Evans and Willett; the *Mammon Fraction* from Evans and Sargeant; and the *Black Eye*, *White Elephant*, *Criterion*, *Monongahela* and *Rob Roy* from W. Bentley; and in Wellington Camp the *Evening Star* and *Sibley* from J. K. Fraser. The bond on Mr. Bentley's five claims is for $40,000; how much the bonds on the others are I do not know, but it is said that that on the *Volcanic* and *Fantantine* approximates $100,000.

The Hesperus Gold and Copper Mining Company, also of Marquette, Michigan, has acquired claims within three miles of Grand Forks, on Fourth of July creek. The claims are known as the *Betts* and *Hesperus* and the *Lancaster* and *Tennessee*. The company has done considerable work on its property, and is well satisfied that it has acquired a valuable asset.

The Granby Consolidated Mining, Smelting and Power Company has taken under bond the *Senator*, *Freemont*, *Victor* and *Thirty-seven*, in Summit Camp, and has already shipped ore from the *Senator*. These claims have been acquired by the company on account of the heavy percentage of iron contained in the ores.

The *Jack Pot Fraction* has been purchased by W. T. Hunter, who, I understand, holds a lease on the *Athelstan*, an adjoining claim. The ore on these claims carries rather high values. It is quarried out and shipped to the Boundary Falls and Greenwood smelters. The *Jack Pot Fraction* was located about a year ago by John J. Farrell, an old-timer in Wellington camp, was bonded to W. T. Hunter for $15,000 during the summer, and was finally acquired by him a short time ago.

The *Seattle*, in Brown's camp, was under bond to the Granby Company for a short time, and afterwards to the Trail Smelter, the latter company doing considerable work on the property and shipping some ore. At present the *Seattle* is not working. The work performed on the claim for the past year consists of 180 feet of tunnel, 175 feet of drift, 70 feet of incline raise at end of tunnel, a drift of 100 feet to south side of tunnel, and one 75 feet long to the north side. Considerable surface work was also done. I am given to understand that the *Seattle* has very good prospects.

Among the mines that have been prosperous and continued work all the summer are the *Snowshoe* and *Athelstan* in Wellington camp, and the *Emma* and *Oro Denoro* in Summit camp.

Work in the following camps has not been very great, on account of the need of transportation:—White's or Central camp, Christina, Burnt Basin and Franklin camps. Some of the best showings in the division occur in these camps, especially in the latter, but transportation facilities will be required for their development.

The *Riverside Group*, in Brown's camp, is owned by Mr. Bentley, and consists of the *Riverside*, *Forest Rose*, *Pennsylvania*, *Hunter*, *Mountain View* and *Last Chance*, all adjoining claims. The work for the past year has all been done on the *Riverside*, which has now an excellent showing.

The *Emma* mine, in Summit camp, shipped 20,000 tons of ore in 1903, and the work performed during the same time includes an incline 100 feet long with 30 feet of face, from which ore is quarried, and another incline drift run from the end of the former for 180 feet, giving a still greater depth of face, from which ore has been stoped at 120 feet in. On this last drift a raise was put through to the surface, 100 feet, and stoping done at the surface, the ore being blasted into the raise, where chutes had been placed at the bottom, whence it was hoisted up the incline. On a lead 700 feet east from the former lode a small plant is being installed, consisting of a 25 horse-power boiler and hoist, a hoisting frame for skip track, suitable for a larger plant, if required. A boiler and hoist building is under construction, 20 by 30 feet. About 300 tons of ore have already been shipped from this vein.

B. C.

The *B. C.* mine, in Summit Camp, took out ore from the large stopes, from the 150-foot level to the surface; this was done from January to August, when the mine closed down. Since work ceased, I am given to understand, the company has sold all the machinery off the mine; why this should have been done it is difficult to know, as the company has a group of eight or more claims, on some of which it is said there are good showings of ore.

Oro Denoro.

The *Oro Denoro* mine, in Summit Camp, has been rapidly coming to the front among the mines of the Boundary District. Here, as in most of the better worked mines, quarrying the ore is the method employed, and the company has shipped over 10,000 tons during the period it has worked the mine in the last year. The property is, I believe, shut down at present on account of the smelter at Boundary Falls having been closed; this is a state of things, however, that is likely to last for a short period only. The work accomplished, since the first of January, 1903, consists of cross-cutting from the main tunnel, 120 feet; quarrying No. 1 vein 120 feet in length, 90 feet in width and 30-foot face; quarrying magnetic vein 75 feet wide, 40 feet long and 40-foot face. Machinery installed consists of:—One 7-drill Ingersol compressor; two Rand drills, size 3½ inches; one Rand drill, size 3 inches; one boiler about 80 horse-power, a 10 horse-power hoist, and two feed pumps, 4¾ by 3¾ by 4 inches. There is a frame compressor building, 30 by 40 feet, and a log powder-house, 12 by 16 feet.

Snowshoe.

The *Snowshoe*, in Greenwood Camp, was handicapped during the months of March and April by the miners' strike at the Crow's Nest coal fields, and, in consequence, lost its usual shipments; nevertheless, the work done on the mine and the amount of ore shipped during the year makes a very fair record. The ore was shipped to the Greenwood and Boundary Falls smelters and amounted to some 70,000 tons. The three-compartment shaft was continued from the 300 to the 350-foot level; of driving, cross-cutting and raising, some 550 feet was done, making a total, in all, of 6,800 feet to date. Considerable surface stripping has been done, and stopes opened up and timbered on the different levels. The new buildings erected and machinery put in during the year consist of ore bins with a capacity of 2,500 tons, head-frame, skip-ways and 150 horse-power electric hoist; also, one 150 horse-power boiler was added to the plant. Sixty men were employed.

The *Winnipeg*, in Wellington Camp, suffered a disastrous fire in May, 1902, and no attempt, from that time until the 25th of August, 1903, was made to work it. On the latter date Mr. Richard Plewman, with five men, started to unwater and re-equip the mine, and had just finished this work when financial trouble again caused it to be shut down. During the period that Mr. Plewman worked he shipped 2,500 tons of ore, partly from the dump and partly from the 50-foot level. It is a pity that such a promising property as the Winnipeg should be so heavily handicapped.

The *Golden Crown*, another well-known property, adjoining the *Winnipeg*, has lain idle for over a year.

Contact.

In the Burnt Basin Camp, at the Contact mines, owned by the Contact Consolidated Gold Mines, Ltd., the No. 1 upper vein, at the 200-foot level, was drifted on for 130 feet, and at the same level a cross-cut tunnel was driven 55 feet, to cut the No. 1 lower vein. No shipment of ore has been made, but a two-ton sample is being prepared for shipment to London, England, for experimental purposes. The vein on the *Treasury Fraction* was stripped for 100 feet, and a shaft sunk to the depth of 20 feet. On the *Preston* the tunnel was extended some 50 feet; and on the *London Prize* a shaft 20 feet deep was sunk, besides other work.

The work on the *Betts & Hesperus Fraction*, in Wellington Camp, on Fourth of July creek, was commenced on the 7th of July last, and has been steadily pushed, since that date, with a small force of men. The work so far accomplished consists of surface work, in the shape of 208 feet of open cuts and shallow shafts to a depth of 25 feet, while 75 feet of tunnel have been driven and a winze 40 feet deep sunk on the vein; from this last, at the present time, an upraise is being made to the surface, which will give a depth of 80 feet, and the intention is to carry this on to the 100-foot level, and then to cross-cut the vein. I am given to understand that the intention of the company is to put in machinery, wherewith to run a tunnel in to tap the lode at a depth of 350 feet. The number of men steadily employed on this property is from four to six.

COAL.

NOTE BY PROVINCIAL MINERALOGIST.—Mr. Wm. Blakemore, mining engineer, of Rossland, has sent me a copy of his final report to the B. C. Coal Co., Ltd., of Toronto, of the operations conducted under his personal supervision on the West Fork of the Kettle river, in an attempt to develop and prove the coal measures there located. Mr. Blakemore states the first thing he discovered was that the whole section of country was a granite formation, with a comparatively small basin of coal formation left by erosion. The points at which he found coal were—(1) one mile north of Boulder creek, and again (2) at Wiseman's camp. He reports the coal to be of good quality, but that he "regrets to say that, after a month of most careful prospecting, I am bound to pronounce this impossible," viz., the finding of coal in workable quantities. At Wiseman's camp the seam of coal, he reports, is 3 inches in thickness.

OFFICE STATISTICS—GRAND FORKS MINING DIVISION.

Free miners' certificates	355	$1,677 00
Companies' "	3	300 00
Special "	5	75 00
Certificates of work	435	1,117 50
Records of location	196	490 00
Conveyances	88	228 40
Certificates of improvements	37	92 50
Permission to re-locate	1	12 50
Filings	56	14 00
Water rights	3	52 25
Miscellaneous		197 08
Fees for Crown grants passed through this office		925 00
		$5,181 23

OSOYOOS MINING DIVISION.

REPORT OF C. A. R. LAMBLY, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report of mining operations in the Osoyoos Mining Division during the year 1903.

FAIRVIEW CAMP.

On the *Stemwinder*, owned by the New Fairview Corporation, the work done during the year consists of 400 feet of drifting, and the continuation of the main shaft 100 feet, while 12,000 tons of ore were extracted and milled. A cyanide plant of a daily capacity of 150 tons has been erected and is now in operation.

On the *Morning Star* the work begun in 1902 was continued, the old shaft was enlarged and sunk to a depth of 300 feet, and at the 150 and 250-foot levels drifts were run, 150 and 255 feet respectively. A 16 horse-power hoist and 30 horse-power boiler were installed, and the necessary buildings for working the mine erected.

The Dominion Consolidated Mines Co., Ld., of Fairview, has done, during the year 1903, work to the value of $1,000, chiefly in upraises on the lead from the tunnels. This work was done for the purpose of taking out ore to make a mill test, besides ascertaining the dip and trend of the leads. Twenty-five tons of unsorted ore were put through the *Stemwinder* mill, giving an average value of $5.08 per ton. Besides this work, the company has expended nearly $1,000 in water power surveys, reports and surveys of the mine. There are now about 1,500 feet of tunnels and shafts on this company's property.

The King Edward Mines, Ld., own the following claims:—The *King Edward*, *Night Hawk*, *Westmorland*, *V. V. & E.*, *Johnny Bull*, *Tip Top*, *Woodland*, *Bank of Fairview*, and *Kendall*. This group is located on the West Fork of Susap Creek, one mile above its forks and about three miles from its confluence with the Similkameen river. Power for mining operations can be easily obtained from the creek, which carries abundance of water throughout the year.

It is reported that the main ledge can be traced in a north-westerly direction through five claims, running over the divide and down to the North Fork of Susap Creek, a distance of about a mile and a quarter, and that in places it shows from 10 to 40 feet wide. The values in this body of ore consist of gold, silver and copper. On the *King Edward*, where the greater part of the work has been done, the ore crops out 200 feet in length by 40 feet in width Here a cross-cut tunnel has been run in and the lead tapped at a depth of 150 feet. On the *Bank of Fairview* there are, besides the main lead, eight well defined ledges of from one to five feet in width.

OLALLA CAMP.

On the *Bullion Group*, during the past year, in addition to several open cuts, over 300 feet of drifting and sinking have been done. The results proved satisfactory and a large body of copper ore has been opened up, carrying gold values.

On the *Flagstaff Group* the annual assessment work only was done during 1903. The ore produced carries gold with a small percentage of copper.

On the *Opulence Group* the work accomplished consists of 25 feet of crosscut, from the bottom of a vertical shaft, at a depth of 45 feet, and is intended to intersect the ore body, which dips to the south-east.

The *Sunset Group* consists of three claims, adjoining the town of Olalla. A shaft sunk 25 feet on the lead shows values in gold. The best returns are obtained from a small vein of quartz, 18 inches in width, occurring in a large quartzite dyke. Samples taken across 4½ feet of the formation, including the quartz vein and adjoining dyke rock, gave values of $5.60 per ton in gold.

The claims comprising the *Elkhorn Group* were surveyed last fall and seven were Crown-granted. No development work has been done on the property during the year.

The *Copper King Group* consists of two claims, the *Copper King* and *Pembroke*. Only the necessary assessment work was done during the past season.

On the *Copper Queen Group* also only the annual assessment work has been done. There are three well mineralised dykes running through the claims, which carry a small percentage in copper as well as small gold values.

On the *Mayflower Group* there is a fine showing of ore of a good grade. The work done during the year consists of open cuts and shafts.

On the *Dolphin Group* there is a large body of copper-gold ore. Only the annual assessment work was done on this property during the year.

The *Goldman Group* is located about one mile west of Green mountain, and has had a very considerable amount of work done on it during the year, which consists of tunneling and shafts. The width of the vein is about 10 feet, carrying values in gold. It is expected the property will be worked on an extensive scale during the coming season. It is easy of access by waggon road, which runs from Penticton to the *Nickel Plate* mine.

On the *Midnight Star*, *Penticton* and *B. C. Groups* assessment work only has been done during the year.

The *Gem Group* is located on Red mountain and has been worked continuously during the year. There is a large body of pyrrhotite ore, which carries gold with small copper values.

The *Shamrock Group* is located on Riordan mountain. The work consists of open cuts and pits on the summit of the mountain, all in ore, the latter consisting of quartz intersected with spar and quartzite, carrying iron and copper pyrites. Some 300 feet below the work on the summit a tunnel has been driven in the outcrop of the ore. This tunnel is in a distance of 50 feet.

The *Independence Group*, which is located on Independence mountain, has been worked continuously during the past season, and together with the development done in previous years, gives very encouraging results. The ore is exposed by open cuts, shafts, tunnels and stripping.

On the *Monarch*, *Rocky Ryan*, *Evening Star* and *Dominion Groups*, all located on Independence mountain, only the annual assessment work has been done.

The *Dividend Group* is the first property located on Dividend mountain. The work during the past season consists of a shaft 25 feet deep and several open cuts. The object of the work was the definition of the contact between the large surface exposures of ore and the adjoining formation. This has been successfully accomplished for a distance of 1,500 feet along the line of contact. The ore is pyrrhotite.

The *Mountain Rose Group* is located on Dividend mountain and adjoins the *Scotia* and *Nellie Groups*. The lead has been exposed for a distance of 300 feet. The ore is pyrrhotite.

The *Maple Leaf Group*, which adjoins the *Mountain Rose*, has been worked continuously during the past season. The development work has exposed a body of pyrrhotite and arsenical iron, carrying an average value in gold and copper of $11 per ton.

CENTRAL CAMP.

In this camp, which is situated on Upper Keremeos creek, 15 miles from Keremeos, on the Nickel Plate-Penticton Waggon road, a large amount of development work has been done during the past season, with gratifying results. The properties are all in the hands of prospectors, over 40 of whom worked on their claims during the past year.

The *Nelson Group* consists of five claims, situate on Dividend mountain, and is owned by Nelson parties. The work done during the season is principally drifts and open cuts. The ore is pyrrhotite and arsenical iron.

On the *Rawhide*, situate on Green mountain, in addition to the annual assessment, a shaft was sunk 25 feet in solid ore.

The *Scotia Group* consists of five claims, located on Dividend mountain, and in addition to assessment work on the claims, a tunnel was driven on the principal vein a distance of 40 feet in the ore, which is pyrrhotite, carrying copper and gold.

On the *Apex* the work done during the season consists of tunnelling, shafts, stripping and open cuts.

On the *Mathieson Group* work was carried on continuously for five months during the past summer, and a fine showing of gold-copper ore is the result.

Nickel Plate.

On this property, which is located on Nickel Plate mountain, about 3½ miles from Hedley, development work has been continued during the year and about 300 feet of tunnels and drifts run, besides which the mine has been put in shape for the extraction of ore. The Daly Reduction Company has erected at Hedley, for the purpose of working this mine, a 40-stamp mill, concentrating and cyanide plant, and has constructed 3½ miles of electric railway and tramway to connect the mine with the Hedley works. A flume (not yet completed) 3 miles long, from 20-Mile canyon, with a capacity of about 1,000 inches of water, will supply power to run the mill and generate electricity and compress air. The company expected to have the machinery in place and the plant in operation by the end of the year, but owing to the difficulty experienced in getting in plant and supplies, it will be spring before the work begins.

OFFICE STATISTICS—OSOYOOS MINING DIVISION.

Free miners' certificates issued	245
Records of location	217
Certificates of work	406
Records of conveyances	79
Certificates of improvements	20

The revenue collected for the above free miners' certificates and mining receipts generally for the year ending 31st December, 1903, was $3,830.55.

VERNON DISTRICT.

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VERNON MINING DIVISION.

REPORT OF L. NORRIS, GOLD COMMISSIONER.

I have pleasure in reporting very gratifying advancement in the mining industry in this district during the year 1903. It is true that only a few new claims have been recorded, and that on most of the locations held but little more than the necessary assessment work has been done, but in the two camps, where work has been carried on continuously, the results have been most encouraging.

On the *British Empire* and *Royal Standard* claims, situated about 5½ miles south-west of Vernon, Mr. Gendar, who has these properties under bond, put up a 5-stamp mill, and is now running a tunnel in to tap the ledge at a greater depth. The first run of the mill of seven days gave $27 to the ton of gold on the plates.

On the old *Monashee* properties, on Monashee mountain, about 50 miles east of Vernon, some $7,000 was expended, under the management of Mr. D. R. Young, in cross-cutting and in extending the tunnels. A strong company of local men has been organised to further develop these claims.

On the *McPhail Group*, on the north-west slope of Monashee mountain, the Cherry Creek Mining Company has erected a 5-stamp mill, which, after running for some time, closed down on account of the cold weather. I have not been able to secure the exact returns, but I understand they were very satisfactory. This company expended altogether about $50,000 on its claim last year, under the management of Mr. Fred Williamson.

As most of the claims in the district have been referred to in my former reports, it is scarcely necessary for me to again refer to them or give the work done on each in detail. The following statistics show the mining transactions for the year.

OFFICE STATISTICS—VERNON MINING DIVISION.

Mining records	61
Free miners' certificates issued	124
Transfers	10
Certificates of work	36
Certificates of improvements	2
Claims Crown-granted	2

YALE DISTRICT.

Report of G. C. Tunstall, Gold Commissioner.

I have the honour to submit my report of mining operations in the Yale District during the year 1903.

The outlook of the Kamloops Mining Division is particularly promising; one of the principal mines has reached the shipping stage and will, it is expected, be in full operation next summer, while another is at present engaged in shipping 1,000 tons of ore to the Crofton smelter, the first returns from which gave a value of $18 to the ton and are deemed very satisfactory. The prospects of the Coal Hill camp are encouraging. The large bodies of low-grade ore are self-fluxing and capable of concentration, besides possessing the great advantage of existing in close proximity to railway transportation.

In the Yale Mining Division, the Mount Baker and Yale Mining Co., of Whatcom, Washington, is about to erect two quartz mills on Siwash creek, near the forks of which a large body of gold-bearing quartz is situated, a short distance above the old town of Yale. One of these mills has been already transported across the river. Mr. Dodd, the Mining Recorder at Yale, further states that all the Fraser river, extending from the upper boundary line of the New Westminster Division to Kanaka bar, will be shortly re-located for dredging purposes.

In the Similkameen Mining Division everything is very quiet, in the absence of railway transportation to render available the mineral resources of the district.

KAMLOOPS MINING DIVISION.

In describing the mining operations in this division I shall merely confine my remarks to those properties on which continuous work has been performed independent of annual assessment requirements, considering it unnecessary to mention the large number of claims held by the yearly expenditure of $100, and which exhibit no changes of importance beyond that mentioned in former reports.

Iron Mask Group.

The *Iron Mask Group* is situated between five and six miles south-west of Kamloops, and consists of the *Iron Mask*, *Sunrise*, *Prince of India*, *Ben Hur*, *Lucky Strike*, *Bonnie Jean* and *Delta Fraction*. The *Iron Mask*, on which the most work has been effected, was first located and recorded by George Breedsen, W. H. Ford and R. H. Lyon on the 13th August, 1896, during the excitement that prevailed at the time, owing to the discovery of extensive bodies of chalcopyrite on Coal Hill. Since then the property has passed through several hands, being first purchased by W. T. Newman, acting as agent for James Armstrong and C. H. Glassford, of Toronto. A tunnel was run into the hill on the vein, and in addition holes and cross-cuts were made to determine the extent of the ore body. The exposure on the surface exhibited a large vein. Subsequently it was sold to the British & Canadian Gold & Silver Mines, which in turn disposed of the property to the Coal Hill Gold, Silver and Copper Mining Company. Over two years ago the B. C. Exploring Syndicate, of London, acquired a bond on the mine for $40,000, which was subsequently paid, and systematic development was proceeded with, under the management of Capt. Argall. Work has been diligently pushed up to the present, with a force of from 20 to 30 men. A double-compartment shaft has now attained a depth of 600 feet. The ore bodies consist of two large lodes, possessing an aggregate width of 100 feet, which have been exploited by five levels, drifts on the veins and numerous cross-cuts, represented by 4,000 feet of rock work, which has amply demonstrated the value of the mine.

Recognising the fact that a large expenditure was still necessary to place the mine in a position to secure the best results, the present owners have made arrangements for the transfer of their rights to the Ashanti Lands, Limited, of London, on favourable terms, including the retention of a considerable interest in the new company. Mr. H. Jones, a mining expert, arrived here from England last October, and made a critical examination of the property. His report was favourable and his principals readily agreed to effect the purchase.

The contemplated improvements consist of sinking the shaft an additional depth of 200 feet; a new hoist; two new Corliss engines of 125 horse-power each; a 10-drill compressor; an electric light plant; a saw-mill and machinery for timber framing. A contract has been awarded for the construction of a large boarding-house (now in process of erection), to provide for the accommodation of a large number of men, and a concentrator with a capacity of treating 200 tons per day, the site for which has been located near a small lake about one-quarter mile from the shaft-house, where the necessary water rights have been recorded.

Copper King Group.

The *Copper King Group* consists of six locations situated about 16 miles west of Kamloops, on the road leading to Savona. The vein on the *Copper King*, which was four feet wide when work was first begun, has since increased with depth to a width of 62 feet. The ledge, to a certain depth, was found greatly broken up and difficult to follow. A shaft has been sunk for 40 feet and a tunnel run a distance of several hundred feet to strike the ore body at a lower level.

Mr. A. N. Gray, of Woodstock, Ont., purchased the property last year, and work was resumed shortly after. Towards the latter part of the summer preparations were made for the shipment of 1,000 tons to the Crofton smelter, the first returns from which gave a value of $18 to the ton in copper and gold, yielding a very satisfactory profit, in consequence of favourable rates obtained for freight and treatment. The following improvements were effected during the past year: 200 feet of cross-cutting; an upraise of 70 feet; an addition to the bunk-house for the accommodation of an extra number of men; three 80-ton ore bins; blacksmith shop; assorting house; stabling for six horses; waggon road about one-quarter mile long, and a gravity tramway.

Orphan Boy Group.

The *Orphan Boy Group* consists of four mineral claims. It lies west of the Python, about four miles from Kamloops. The surface exposure is very promising. The vein is in a diorite formation and exhibits a width of 20 feet, 7 feet of which is solid ore. The mineralisation is chalcopyrite, which assays about 6 % in copper. A shaft has been sunk to a depth of 30 feet, and several deep cross-cuts made on the surface. The owners are Messrs. Willis and Delaney.

The *Evening Star* belongs to Mr. John Morrison, of Kamloops. The vein is 42 feet wide, containing chalcopyrite possessing an assay value of 6 % in copper. The work performed embraces an open cut 54 feet long, averaging 3 feet deep, connecting with a tunnel 24 feet long, 6 feet high, 4 feet wide.

The *Lost Chord* is owned by W. W. Wood. Considerable work has been done on this property during the past year. The vein is exposed for over 400 feet by a series of cross-cuts. At present a tunnel is being run which will tap the vein at a depth of 110 feet from the surface.

The Glen Iron Mines, on Cherry Creek, have not been worked during the past year.

Assessment work merely has been performed on the mines in the vicinity of Kamloops lake and Savona.

PLACER MINING.

The dredge operating on Tranquille creek, owned by Mr. T. L. Boyd, of London, has paid little over expenses. It has been ascertained that a considerable amount of fine gold is not saved, as proved by prospects obtained from holes sunk in the gravel, which gave a value of 14c. to the cubic yard, whilst the dredging returns did not exceed 2½c. to the same quantity of ground. It is the intention to put in six more tables to prevent this serious loss. Frequent breakages also occur which consume a good deal of time in repairing. The ground improves as progress is made up stream, and the large boulders are becoming less numerous. Operations are confined to a depth of from 12 to 14 feet. Most of the gold will be found on the bedrock, which has not yet been reached.

NICOLA VALLEY.

Mr. Geo. Murray, Deputy Mining Recorder, sends me the following information relative to the work done in the Nicola valley:—

Development has progressed favourably in the Aspen Grove camp, which has been visited by a number of mining men recently. On the *Big Sioux* a well-timbered shaft has been sunk for 40 feet in ore, much of which is high grade in copper, and a drift has been run from the bottom of this shaft for 30 feet. On the *Maggie*, *Victoria* and *Royal Fraction*, a group of claims having the same owner as the *Big Sioux*, there is a well-timbered shaft 40 feet deep, and a contract has been let for an additional 30 feet. The exposures on the group are very favourable.

On the *Troy Fraction* and the *Giant* the ore bodies appear to be of considerable extent, and the tunnelling, cross-cutting and stripping done have satisfied the owner, Mr. Schmidt, that with transportation facilities it will be possible to commence shipping.

On the *Copper Standard*, one of a group of four claims, a 6 by 8-foot shaft has been sunk for 55 feet, giving a depth of 100 feet below the summit of the ridge. A cross-cut has been run for 50 feet from the bottom of the shaft and the showings are very favourable.

On the *Portland*, owned by parties from Terre Haute, a shaft has been sunk for 115 feet' with a cross-cut of 106 feet. The work done, together with surface stripping, has shown a considerable extent of ore, and the owners are very well satisfied with the prospects of this property.

On Messrs. Lassen & Co.'s claims, situated about a mile north-east of the *Copper Standard*, a tunnel 28 feet long has been run, and when extended twice that distance should cut the ore body at a depth of 100 feet.

Among other claims being developed may be mentioned those of Messrs. Bates Bros. & Co., some of which have exceptional showings; those of Messrs. Silverthorne, Rogers & Co., for two of which Crown grants have been applied for and in which American capitalists are interested; the property of Messrs. Starwell, Murray & Co., on Bare mountain, on which five assessments have been performed with satisfactory results, and several groups owned by an old prospector, Dad Allen, who is steadily carrying on development. Assessments are also being regularly performed on many other locations.

In the Ten-Mile creek section, the *Aberdeen* has received considerable attention, and the owners are said to have refused some good offers for the property. Development has been steadily carried on with good results, and 30 feet of drifting have recently been done. Notwithstanding the satisfactory returns, it was found impossible to continue shipments without transportation facilities. At present the ore has to be rawhided for a mile and then carried 50 miles by waggon.

On the *I. X. L.*, on which there is an extensive surface exposure, a shaft has been sunk for 80 feet, and assays running from 9.5 to 37 % of copper, with a little silver, have been obtained.

On the *Alice* and *Champion* a cross-cut tunnel was commenced about 90 feet below a vein exposure, but, so far, has not intersected the lead. Assessment work has been done on the *Nottingham*, *Golconda*, *Mountain View*, *U. L. L.*, *Manchester*, *London*, *King Solomon's Dream*, *Copper Belle*, *Boulder*, *Alice*, *Champion*, *Saucy Lass* and *Saucy Sally*. Mr. Thos. Hunter has also completed his assessments on and obtained Crown grants for three claims on Mill creek; the values are in gold and copper and are singularly uniform. There are a number of other isolated claims, concerning which I have not been able to obtain any information as to work done. Twelve locations have been made on iron ore, some of which is reported to be hematite.

I have to thank Mr. Arthur Potocki for information supplied by him.

OFFICE STATISTICS—KAMLOOPS MINING DIVISION.

Claims recorded	108
Certificates of work	187
Bills of sale registered	25
Mining leases issued	9

Revenue.

Free miners' certificates	$2,054 00
Mining receipts general	1,824 55
Tax on mineral returns and placer gold	34 31
Tax on Crown-granted mineral claims	266 97
	$4,179 83

ASHCROFT MINING DIVISION.

REPORT OF J. W. BURR, MINING RECORDER.

I have the honour to submit herewith my annual report of mining operations in the Ashcroft Mining Division for the year ending December 31st, 1903.

Placer Mining.

As a consequence of the very low water in the early part of the season in the Fraser and Thompson rivers, the yield of placer gold from bars, etc., was much better than usual, Indians and Chinese taking out a large quantity of dust with sluices and rockers. Very few white men engage in this method of mining at the present time.

The Fraser River Gold Dredging Co., operating near Lytton, on the Fraser river, was late in getting to work this year, owing to the necessary overhauling of its large bucket dredge, which was sunk near Van Winkle bar early in the season. New and improved machinery was also required for it, but did not arrive till late in the summer, with the result that work was not begun until towards the last of November, although from that time on, until the end of December, the clean-up was most satisfactory. This company has also under construction and nearing completion a new dredge of the latest improved style. The pontoons are built of steel, and will thus be able to withstand the float ice which comes down the Fraser in the winter and spring. The machinery, which is of the very best description, is now being placed in position, and it is expected that work will begin very early in the spring of 1904. The company has secured leases on the Frasor river, between Lytton and Lillooet, covering over 35 miles, and during the construction of the new dredge a large force of men was employed.

The total output of placer gold for the year from this division was $39,600

Mineral Claims. Very little beyond assessment work has been done on the various mineral claims in this division during the year. The various companies owning properties in the Highland valley have been awaiting the completion of the waggon road into that section to enable them to get in machinery, which it is almost impossible to do at the present time. The attention of capitalists has been directed to the possibilities of Highland valley, and it is expected that considerable development will be done in the near future, while the early completion in the spring of the road mentioned will greatly facilitate the opening up of this locality.

About 12 miles from Ashcroft, on the Savona road, some well-defined ledges, carrying good values in gold, silver and copper, have been discovered, and several claims have been located. The parties now operating these claims are sinking on the ledges and the ore is improving very much with depth. The owners are very well satisfied with the properties and eight claims have been recorded in all.

OFFICE STATISTICS—ASHCROFT MINING DIVISION.

Free miners' certificates issued	68
Mining receipts general	56
Certificates of work	45
Mineral claims recorded	41
Placer claims recorded	2
Bills of sale, etc	13

Revenue.

Free miners' certificates issued	$ 542 75
Mining receipts general	1,337 80
Total	$1,880 55

YALE MINING DIVISION.

REPORT OF WILLIAM DODD, MINING RECORDER.

I have the honour to submit herewith my annual mining report and office statistics for the Yale Mining Division for the year ending December 31st, 1903.

Placer Mining. The main source of output derived from the mineral resources of the division has, so far, come under this heading and of its three sub-divisions: (*a*) hand-work (rocker and sluice); (*b*) hydraulicing; (*c*) dredging. The first and most primitive has up to the present supplied a greatly preponderating amount of the large sums contributed by this district since 1858.

The number of Chinese bar-miners diminishes slowly but steadily, as does also the yield from this branch of the industry, and making the usual allowances for the defective sources of information through which our estimates are compiled, a sum of $10,800 may be given as the total output from this source. Of this figure no less than $1,500 was gained by the "Castle" local syndicate, which located on the old Saw-mill Riffle, above Hill's Bar and opposite Yale, at extreme low water on the 21st March, 1903. The Fraser had then dropped to its lowest point since 1859, and although there were still a few inches of water over the space of 50 by 50 feet which was worked, and the shovelling was therefore indifferent, results to the individual approached more nearly than ever before to the period of the first discovery of gold. The gravel covers, at this part, a ridge of bed-rock, which projects across the river and which could be touched by the miners' shovels. The rising waters permitted operations for some nine days only. August Castle is said to have taken out $75, the best day's work for one man. The maximum number of hands at work on any one day was 15, most of them working on a "lay-out." The best pans on the pay-streak went as high as $2, and the heaviest pieces of gold obtained were worth a dollar.

The owners have now on the ground material, cars and track, and the construction of a wing-dam will be started, immediately on the river becoming low enough, the length of which is to be 300 feet and height 4 feet, by 3 feet 6 inches in breadth. Efforts will be made to make it of such strength that it will last for more than one season. Should the river lower sufficiently to allow of building, and it is found practicable to get near bed-rock, a good return may be hoped for. Unfortunately, the present indications do not point to even normal low water, and on that the matter hinges.

This ground had been skimmed over before by a dipper-dredge, but, so far as I am aware, no knowledge was obtained of the exceptional pay existing, which leads to some conjecture as to what may reasonably be expected from really efficient types of that class of machinery under efficient management. Should no new placers be discovered in the remoter and partially unexplored districts of West Yale, it may be assumed that the future of alluvial mining in this district will be confined to dredging and, possibly, steam-shovel work. At the present moment there are no dredges at work in the Division, although considerable areas are held by lease, and three new dredging leases have been taken up between Kanaka bar and Boston bar. Generally speaking, a good deal depends on the results obtained by some of the newer and thoroughly equipped machines about to be put in operation in Lillooet district and elsewhere, and good returns in those vicinities will quickly lead to a resumption of operations in other parts.

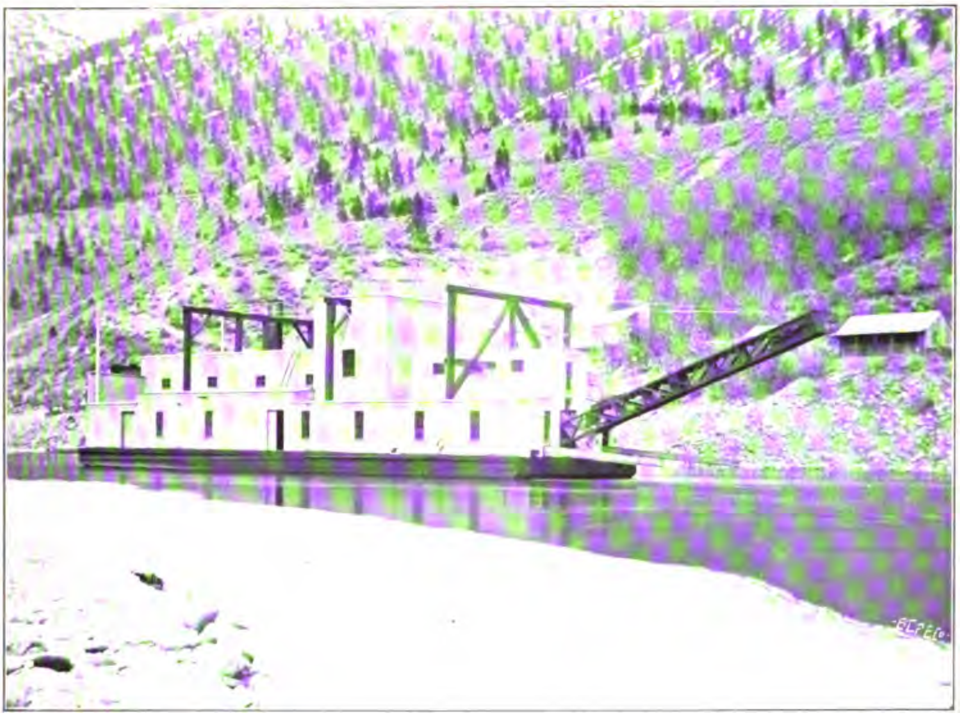
The Yale Hydraulic Co. has recently placed a large quantity of 18-inch pipe on its ground (three leases), two miles east of the last mentioned ground. The water is obtained from Siwash creek, and gravel will be piped above the present channel of the river.

The Pacific North-West Mining Co., on Siwash Creek, continues advancing its operations towards the bed-rock, working up from the 300-foot tunnel, which is being run in the bed-rock of Siwash creek, and is provided with 4-foot sluices, block riffles, etc. It is hoped to strike the pay gravel in 125 feet. The drainage and sluice tunnel taps the creek 40 feet below the bed, and during the freshet season is closed by iron sluice-gates, which on resumption of work are lifted by gear, whereupon the accumulated débris is swept down and through, leaving the workings in condition for piping; the face of the bank is 800 feet distant, and 1,200 inches of water are available under favourable conditions. Some $40,000 have been expended altogether on this property, on which there is also a small saw-mill. Occasionally coarse gold with quartz attached is met with, in value as high as $3.50 the piece.

Mineral Claims.

With two exceptions in the immediate vicinity of Yale, little lode mining is being done in this Division. The usual reasons are given, but the original locators might often do a good deal more to help themselves by

TOWN OF LILLOOET, B. C.



IOWA-LILLOOET GOLD MINING COMPANY'S DREDGE AT LILLOOET, B. C.

developing, to the best of their powers, the ground they occupy, instead of waiting for assistance from the outside capitalist. There is nothing to report in the way of operations on the *Murphy Group*, or the several old claims on Eureka mountain, at Hope. Both mines have had large sums expended on them in past years. Somewhat lower down the river assessment work has been done on the *King Group* and also on the claims staked two years ago, a couple of miles from the village of Hope. These last have a ledge of arsenical pyrites, the clean ore from which runs not less than $20 and up to $60 per ton in gold, with additional values in copper and silver. As they are only two miles from navigation and waggon road, the owners hope to get out a car-load of ore for a smelter test this summer.

In that part of the Summit City camp which lies in West Yale Division (the line divides it, leaving one-half in the Similkameen Division), Messrs. Stevenson and Shannon did their annual work, as an excellent bridge was built this year at the Coquihalla crossing; it will, in future, be possible to reach this promising silver lead camp in a day's ride from Hope, irrespective of freshets. The principal owners, the Star Mining Co., of Terra Haute, Indiana, U. S. A., state that it is expected to resume operations in 1904, the litigation of the last few years having been adjusted.

Messrs. Allan and Gisby continue to develop their group at Keefers, and have in the aggregate performed a large amount of exploration.

Marked activity is shown in connection with the operations of the two American companies on Siwash creek. The Mount Baker and Yale Co. has six claims on the North Fork of the creek, about 1,500 feet above sea-level, the principal locations being the *Old Puss*, *British Queen*, *Captain Jack* and *Louisabelle.* The mineralised area is of an average breadth of 150 feet, and has been prospected by an 80-foot tunnel and many shorter ones, as well as being developed naturally by numerous water-courses. There is at present a good pack-trail leading from the new cable-cage ferry, built this year to the mines by the company. There has now been taken across the Fraser a ten-stamp mill, and the foundations are being graded for the same. It is of Denver manufacture, and is to be increased, it is stated, to forty stamps during the coming season. Power will be supplied by a Pelton wheel, and it is expected to begin crushing about the middle of July, 1904. The water supply is derived from the Middle Fork of Siwash creek. A saw-mill is also being erected.

About three quarters of a mile away are the claims of the International Gold Mining Company, which is also erecting a six-stamp battery on the *Ward* claim, on the South Fork. The mill is of San Francisco manufacture, and Pelton wheels, saw-mill and buildings are in course of construction. Both concerns expect to be able to quarry the ore, which they assert is free-milling and is said to run from $4 to $10 per ton, according to the particular claim.

Note by the Provincial Mineralogist.—Actual prospecting and development have been in progress on Siwash creek during the past year, with results which have led to the erection of a small stamp-mill to accurately determine the practical value of the deposits by a working test.

The Mount Baker and Yale Mining Co., of Whatcom, Washington, has acquired some eight claims (about 244 acres) on Siwash creek, near the junction of the South Fork and some six miles from Yale, from which latter point a good waggon road has been built.

What is described as a large "dyke or ledge of quartz-porphyry" has been uncovered at the forks of the creek, and is reported as carrying free gold in small quantities disseminated through it; the company's engineers, who have sampled it, claim an average of $3 per ton in free gold. It is so difficult to sample an ore-body of this sort by hand sampling that the Company has decided to put up a 10-stamp mill to prove the value of the deposit, and, if satisfactory, a large stamp-mill will be erected.

Several placer leases have been taken up on Siwash creek by Frank and William Richards, the Pacific N. W. Mining Corporation, Henry Stanislawsky and others, and are reported as giving good prospects, but no actual mining operations have as yet been started.

OFFICE STATISTICS—YALE MINING DIVISION.

Mineral and placer claims recorded	30
Placer leases	7
Grants of water rights recorded	8
Bills of sale and permits	11
Powers of attorney	2
Certificates of work issued	24
Dredging and hydraulic leases in force	17

Revenue.

Free miners' certificates	$ 326 00
Mining receipts general	1,234 10
Miscellaneous	823 00
	$2,383 10

SIMILKAMEEN MINING DIVISION.

REPORT OF HUGH HUNTER, MINING RECORDER.

I have the honour to forward my annual mining report on the Similkameen Mining Division for the year 1903.

Placer Mining. The past year has not been favourable for placer mining on account of a late spring and an unusually wet season, which kept the streams almost to high water mark, and so prevented wing-damming. In consequence, the yield of gold and platinum was small in comparison with previous years. A few Chinese were mining on the upper part of the Tulameen river, near Champion creek.

Mineral Claims. There has not been much development done on mineral claims, the owners merely satisfying themselves with doing sufficient work to hold them. The Boulder Mining Company, Limited, owns five claims in one group, situated between Boulder and Elliot creeks. An incline shaft was sunk 80 feet deep to prospect the ground, and an average sample of ore sent to the Trail smelter, returning $55 per ton in all values, chiefly gold. A working tunnel was also started and was driven 95 feet. It is intended pushing the work this season until the hanging wall is struck.

On Bear creek Charles F. Law is developing two gold-copper claims, known as the *St. George* and *St. Lawrence.* On the *St. George* a shaft has been sunk 45 feet by 5 feet by 7 feet, and a vein of high grade copper and gold has been found.

On the *St. Lawrence* a shaft has also been sunk 53 feet by 6 feet by 6 feet in arsenical iron and rock, and contains high grade copper and gold with an 8-foot well-defined ledge. Mr. Law intends to continue this work so soon as the spring opens.

The *Liverpool* and *London* are adjoining claims with similar ore, but have not sufficient work done to prove them.

On Copper and Kennedy mountains most of the important claims have been Crown-granted, and the owners are waiting for transportation facilities to develop them.

On Roche river and in Summit camp assessment work only has been done.

Several free milling ledges have been struck during the past season on the upper portion of Granite creek, but as little or no work has been done on them it is impossible to give any accurate description thereof.

OFFICE STATISTICS—SIMILKAMEEN MINING DIVISION.

Free miners' certificates	147
Location records	310
Certificates of work	350
Conveyances, etc.	117
Certificates of improvement	35

Revenue.

Free miners' certificates	$ 912 00
Mining receipts general	3,087 00
	$3,999 00

LILLOOET DISTRICT.

CLINTON MINING DIVISION.

REPORT BY F. SOUES, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report on the Clintion Mining Division, together with mining and office statistics, for the year ending December 31st, 1903.

I regret to have to report that mining in all its branches has been almost at a standstill in this Division during the past year. The total yield of placer gold is placed at $7,100, this amount being based on the total ascertained output for the year and an estimate of that which undoubtedly passes from the itinerant Chinese miner to the Chinese merchants at Ashcroft and the Coast cities, to precisely what extent cannot be determined. Placer mining is represented by a hydraulic lease at Big Bar, which paid good wages during the year, placer claims elsewhere having been abandoned; the other sources of the season's yield are the bars and benches of the Fraser river, from which gold is obtained by the Chinese and Indians

Other than a little development work, nothing has been done on the mineral claims of the Division, nor has any further prospecting for coal been carried on.

OFFICE STATISTICS—CLINTON MINING DIVISION.

Mineral claims recorded	5
Placer claims re-recorded	2
Certificates of work	12
Certificates of improvement	2
Crown grants issued	2
Mining leases in force	2
Dredging leases in force	10
Revenue.	
Free miners' certificates	$113 50
Mining receipts general	220 50
	$334 00

LILLOOET MINING DIVISION.

REPORT OF C. PHAIR, GOLD COMMISSIONER.

I have the honour to submit my annual report of the progress of mining in Lillooet Mining Division during the year 1903. The depression in mining matters in this Division has not been removed much during the year.

MINERAL CLAIMS.

Assessment work only has been done on the claims now held, with the exception of four properties, viz.:—

The Anderson Lake Mining and Milling Company's claims on McGillivray creek were worked during the season with a force of 9 men; 40 feet were driven on the lower tunnel with an upraise of 60 feet and 3,500 tons of ore were milled, yielding $1,495.

The *Lorne Group*, on Cadwallader creek, was worked the greater part of the season by 4 men; 152 tons of ore were crushed by an arastra and yielded $3,045.

On the Bend 'Or mines, Cadwallader creek, development work was carried on with 4 men during the whole year by Mr. A. Abbott, M. E., who has a bond on the property. No. 2 tunnel has been driven 220 feet, showing a continuous vein of low-grade ore two feet in thickness. A new cross-cut tunnel is now in 225 feet, and will explore the ore body below the present workings at a depth of 250 feet from the surface. It is expected that this tunnel will be completed next April and will be about 600 feet long. Mr. Abbott spent the greater part of the season at Cadwallader creek and he kindly gave me the following notes:

"From personal observation I conclude that the gold-bearing veins of the Cadwallader Creek district are contained in a diorite dyke several hundred feet in width, flanked on the north by slate and on the south by a narrow belt of serpentine. I have traced this dyke for about six miles, and I am credibly informed that it can be followed to within the vicinity of Anderson lake. To my mind, these facts contradict the view taken by some that this section has been materially disturbed, or that it is a slide from the adjacent mountain. While the veins are not large, they are singularly free-milling, and the ore of uniformly good quality. Considering the small portion of this country that is not covered by soil and drift, I am surprised at the number of claims on which pay-rock has been exposed."

Last July Mr. W. W. Brown, representing eastern capitalists, took a bond on the *Peerless, Imperial*, *Evening Star*, *Royal* and *Eclipse* mineral claims, known as the *Royal Group* and situated near the North Fork of Bridge river. Energetic work commenced at once and a tunnel of 110 feet was driven to cross-cut the main ledge at a depth of about 600 feet; this it is expected to strike in another 30 feet. The ledge has been opened in three different places above the tunnel, and in no place shows less than six feet in width. Good values in gold silver and copper were obtained from all the openings. Two preliminary cyanide tests have been made, and if the ore at depth is the same as on the surface, it can be treated by this process, in which case this will prove a promising property.

PLACER CLAIMS.

The Bridge River and Lillooet Gold Mining Company's and the Pacific Development and Improvement Company's claims on Bridge river were worked during the season, under the joint management of Mr. W. W. Brown, with an average force of 14 men and an expenditure of about $13,000. The pipe-line was changed and a cut washed out 700 feet in length by 250 feet in depth. Numerous large boulders were encountered and it was found necessary to instal a hydraulic hoist, which worked satisfactorily, removing about 25 boulders, of from 1 to 5 tons, in an hour. The hoist can lift 10 tons. The season ended before all the boulders were removed, so that very little gold was obtained.

The Lillooet Hydraulic Company's lease at the Fraser river bridge was again worked by 6 Chinese.

Four claims were recorded on the South Fork of Bridge river, near the *Forty Thieves Group* of mineral Claims, and from these $1,500 was taken.

The traders at Lillooet report purchasing $15,515 worth of placer gold during the year.

Dredging.

A dredge, the largest of the kind in Canada, is being built on the Fraser River, at Lillooet, by the William Hamilton Manufacturing Co., for the Iowa Lillooet Gold Mining Company, and will be completed next February (1904). The intention was to have it finished last November, but a labour strike in the East delayed the manufacture of the machinery. The hull is 100 feet long and 34 feet wide, built of Douglas fir; the bow is sheeted with steel plate; the main gantry, which supports the ladder, is constructed of steel, and the ladder, which is 72 feet in length, weighs 90,000 lbs., and has a continuous chain of steel buckets, each of which is capable of carrying six cubic feet of gravel. The gravel will be discharged into a revolving steel screen, 5 feet in diameter by 24 feet in length, perforated with holes. The gravel, in passing through the screen, will be washed by water pumped into it at the rate of 3,500 gallons per minute, and the small gravel and gold will filter through the screen to the tables, while the larger material passes on to the elevator, or stacker, which delivers it 40 feet from the stern of the dredge. The tables, having a fanning motion, are so designed as to save all the gold, but, for greater safety, the gravel afterwards passes through an undercurrent quicksilver trap. The dredge will be operated by five engines. The main engine will operate the buckets, screen and gold tables, and is a 116 horse-power marine; the pumping engine is 35 horse-power marine; the ladder engine is 30 horse-power horizontal; the dynamo engine is 6 horse-power, directly connected with the winches which handle the two head cables and the four side ones. The total weight of the machinery is 230 tons. If the result of this dredge be satisfactory, others will be built near Lillooet in the immediate future.

OFFICE STATISTICS—LILLOOET MINING DIVISION.

Mineral claims recorded	30
Certificates of work recorded	64
Conveyances recorded	27
Water grants issued	2
Placer claims recorded	8
Mining leases in force	25
Dredging leases in force	2
Water grants in force	19
Free miners' certificates issued	115
Company "	5

Revenue Collected.

Free miners' certificates	$ 987 50
Mining receipts general	2,051 90
Mineral tax	42 66
Total	$3,082 06

Total revenue, Lillooet office .... $16,929 65.

VANCOUVER ISLAND AND COAST.

ALBERNI DISTRICT.

ALBERNI MINING DIVISION.

Report of A. L. Smith, Gold Commissioner.

I have the honour to submit my annual report on the progress of mining in the Alberni Mining Division during the year ending December 31st, 1903.

On the *Constitution*, situated on Constitution creek, eight men have been employed during the past season, the work performed consisting principally of tunnelling on the lead for about 200 feet, this development showing a continuous ore body 4 feet in width, with a reported value in gold and copper of $20 per ton. There is also a quantity of lower grade ore, and as soon as a road is built to deep water, a distance of about a quarter of a mile, and a wharf constructed, the property will be in a position to commence shipping. The ore is also in demand for fluxing purposes by the local smelters of the coast.

The *Southern Cross*, situated on Uchucklesit harbour, one-half mile from Alberni canal and 250 feet from deep water, has been worked since the 1st of April, 1903. Development consists of an open cut 20 feet long and 16 feet wide, which is the width of the ore body, while a shaft 30 feet deep has been sunk. Two men were employed until the 1st of November, while at present 12 men are at work and a chute is being constructed to send the ore to deep water for shipment. There are about 300 tons of shipping ore on the dump, averaging $25 per ton in gold, silver and copper, the copper values predominating. This property will be making regular shipments during the winter months, as there is a considerable quantity of ore exposed on the surface.

On the *Happy John Group* considerable work has been done during the past season, consisting chiefly of stripping the lead at different points throughout the property. A very large ore body has been discovered on the *Happy John No. 2*, and is distinctly traceable through the adjoining claims.

Development has been carried on on the Alberni Copper Company's claims at Nahmint, and a considerable amount of assessment work has been done on Copper mountain and in other parts of the division.

Mining operations have been suspended at the Nahmint mine (Hayes mine) and at the Monitor mine, both properties situated on the northern side of the Alberni canal, near its outlet.

Office Statistics—Alberni Mining Division.

Free miners' certificates issued	$ 376 75
Mining receipts general	3,120 20
Mineral tax	42 10
	$3,539 05

CLAYOQUOT MINING DIVISION.

REPORT OF W. T. DAWLEY, MINING RECORDER.

I have the honour to submit my annual report of the mining operations in the Clayoquot Mining Division for the year ending December 31st, 1903.

As compared with other years, there has been a large falling off in work, only a few of the properties having had more than their annual assessment work done.

Among the promising prospects in the district are the following:—

ELK RIVER AND KENNEDY LAKE.

The *Rose Marie Group*, owned by the Boseco Mines, Ltd., of Vancouver, has had, during the greater part of the year, further work done on its claims, viz., *Rose Marie No. 1, 2, 3, 4, 5, 6, 7* and *8*. This is a free-milling property, with a concentrator plant and good buildings erected on the ground.

The *Grizzly* and *Cinnamon Bear*, on Elk river, a little above the *Rose Marie Group*, are owned by John Irving, of Victoria, and C. Sundvall and A. Spittall, of Clayoquot. These claims were located in July, 1902, and work was commenced on them some months afterward, five certificates of work having been issued in favour of each location.

The *Edith Group* comprises three claims on Elk river, the property of T. Stockham and L. Grant, both of Clayoquot. Development work was performed on this group last spring and summer, with very promising results, over 100 feet of tunnelling, besides other development work, having been done.

The *Ironsides*, the property of G. I. Dunn, is a comparatively new find and from work done the showing is most satisfactory.

Other properties in the Elk river vicinity are the *Leora Group* and *Island Belle*, owned by J. Irving and W. Wilson, of Victoria; the *O. K. Group*, owned by T. G. Norgar, of Clayoquot; the *Poet Group*, owned by W. H. Porter and W. Kershaw, of Clayoquot, and the *Climax* and *Victoria*, owned by Paul and Antone Wollan, of Clayoquot.

BEAR RIVER.

The British Pacific Gold Property Co., Ltd., of Victoria, owns the *Seattle Group*, on Bear river, and has had men employed working and developing it for the best part of the year.

The *Corona* and *Belvidere Groups* are the property of Messrs. Hovelaque & Waterhouse, of New Alberni, and from year to year their assessment work has been done.

On the *Big Interior*, owned by Messrs. J. A. Drinkwater and Frederick Nichol, there is a large body of ore, but owing to its distance inland it has not received the attention and notice that it would have had if situated nearer to the sea coast.

SIDNEY INLET.

The *Indian Chief Group* is owned by the Dewdney Canadian Syndicate, and is a copper proposition. There are some tons of ore on the dump, and a large wharf was built during the year ready for shipping ore out in the early part of 1904.

The *Prince Group*, owned by a Scotch syndicate (Dr. T. R. Marshall, Mgr.), consists of eight claims, which are all Crown-granted. No work was done during the year, but it is understood that operations will be resumed during 1904.

Messrs. J. A. Jones, J. McInnis and J. Bock have promising properties close to and adjoining the two above-mentioned groups.

OPEN CUT, PEERLESS MINERAL CLAIM—QUATSINO SOUND.

OPEN CUT ON JUNE GROUP--QUATSINO SOUND.

DEER CREEK.

Among the properties that are worked each year are the *Hettie Green Group*, which is under the management of James Thomson, of Alberni. This group, of about seven claims, was among the first locations made in the district and considerable work is being done each year, developing some yellow copper ore.

The *Crow*, owned by Messrs. Drinkwater and F. Jacobsen, is another property in this section which has good showings.

The *Sunrise Fraction*, owned by Messrs. Young Bros., of Saanich, also shows up very well.

TROUT RIVER.

The *Good Hope Group*, owned by the Helga Gold & Copper Co., of Seattle, has had a large amount of work done on it in tunnelling to strike the lead. At the expiration of the last contract which was let, a large body of ore was uncovered.

HESQUOIT LAKE.

The *Brown Jug Group*, owned by Messrs. A. Norris and partners, of Alberni, the *Thelma Group*, the property of F. Jacobsen, Port Essington, and the *Agnes* claims, owned by Messrs. J. Eik and F. Jacobsen, are all situated on or near Hesquoit lake, and receive considerable attention.

NOOTKA SOUND.

The large iron deposits at Head Bay, owned by Messrs. Dawley, Poole and Grant, as well as those owned by Messrs. Haugen and Netherby, have very favourable indications, outcrops running from 8 to 40 feet wide. Little development, with the exception of surface work, has been done, but the close proximity to deep water and the present showings give great encouragement for further operations.

AHOUSAT.

Iron and copper outcrops are found on Matilda creek, and the properties owned by Messrs. Watson and Sullivan, of New Alberni, by Messrs. J. Beck and T. T. Gardhouse, of Ahousat, and also by Messrs. J. Irving, Poole and Dawley, have had considerable work done upon them.

The *Ormond* claims, owned by Messrs. Beck and Gardhouse, have recently been bonded to a Victoria syndicate, and will be worked in the early part of 1904.

DISAPPOINTMENT INLET.

The *Kalappa* mineral claim, owned by Messrs. Chesterman, Jensen and Jacobsen, yields samples of ore giving high gold values.

The mineral claims mentioned are all within easy reach of salt water, and the district abounds in good streams which could be utilised for power in developing the various properties, while first-class timber for mining purposes is everywhere to be found.

OFFICE STATISTICS—CLAYOQUOT MINING DIVISION.

Free miners' certificates issued	48
Mineral claims recorded, 1903	33
Certificates of work recorded	134
Bills of sale, bonds, etc., recorded	29

Revenue.

Free miners' certificates	$220 25
Mining receipts general	501 55
	$721 80

QUATSINO MINING DIVISION.

REPORT OF B. W. LEESON, MINING RECORDER.

I have the honour to submit my report of mining operations in the Quatsino Mining Division during the year 1903.

There were 72 mineral claims in good standing at the end of 1902. The principal mining operations and mineral claims of the division are nearly all situated adjacent to the waters of Quatsino sound.* This fine body of inland water has a shore line of probably 300 miles. The mineral bodies are diversified, and are found on all the arms of the sound. On the West arm iron and coal deposits have been discovered, while on the South-east arm copper and gold ores exist. On the north side of the main sound and on Forward inlet coal formation occurs, some small croppings of a fine quality of coal being known on Winter harbour, although none of sufficient size to work. Timber is plentiful, a number of fine water-powers are available, and the nearness to the sea renders the transportation problem an easy one. These natural conditions offer the mining investor advantages worthy of serious consideration, a fact which is shown by the number of mining companies now operating in the district.

INGERSOL RIVER.

Claims have been located in nearly all parts of the division this present season, but principally in the neighbourhood of Ingersol river, to which quite a rush took place.

This river comes into the main sound from the south, opposite the south shore of Limestone island, and drains the same range of hills that the *Yreka* and *Edison* properties are on, being in the same mineral zone.

In May, 1902, the *Blue Bird* and *Mystic* mineral claims were located by P. Cramer and O. Strandwald, on Ingersol river, about half a mile from its mouth. The ore was magnetite carrying gold values. A tunnel was run in 30 feet, tapping the lead at 40 feet depth and showing the same class of ore, whereas copper was expected to be found. On further prospecting up the same river this year, Messrs. Erickson and Hanson found the lead some 40 feet wide, well defined, crossing the stream. The *Ingersol*, *Stella* and *Olga* mineral claims were located. Hearing of this, a number of prospectors went in and the lead was traced over 15 claims. A total of 19 claims were recorded in the vicinity. Assays of the ore show 58 % metallic iron, and as high as $9 in gold to the ton. A group of 13 claims located this year are about to be bonded by a Mr. Frank for a company which will exploit the deposit and endeavour to ascertain the extent of the iron.

Yreka Mine. * This mining property represents the principal mining operations in the district. The Yreka Copper Co. owns 16 claims, situated on the south shore of the South-east arm of Quatsino sound. The company shipped about 2,500 tons in the early part of the season, the bulk of the ore being quarried out of the "Clyde Cut." In May the North-western Smelting and Refining Co. assumed control of the property, since when about 1,500 feet of drifting has been done. In August operations were suspended for lack of water to run the compressor. In the beginning of October work was resumed and some promising ore is said to have been found. The company is applying for a Crown grant. The property is fully equipped with wharf, bunkers, aerial trams and an air compressor run by a Pelton wheel, there being a fine water-power available.

June Group. * The *June Group* is operated by the Copper Mountain Mining and Development Co., and consists of five claims about five miles from the shore of the South-east arm. The ore is a copper sulphide carrying values in gold. The principal development work on the property is an open cut on the *June* claim, exposing a large body of ore, while a number of exposures along the strike of the vein show the same class of ore over three claims. Owing to the quality of the ore and the extensive showing, the company is holding the property at a high value. The principal work this year has been on the trail from salt water, which is now in fair condition. This trail connects the South-east arm of Quatsino sound with Victoria and Alice lakes, and has been a great advantage to prospectors this year. Some zinc ore has been found near the foot of Victoria lake, four claims being recorded by Messrs. Satra, Leeson and Bryce. The claims will require considerable development work to prove the value of the deposit.

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* *See* Provincial Assayer's Report on Quatsino Sound, p. 196 *et seq.*

Edison.

* This claim, owned by the Edison Mining Co., of Tacoma, joins the Yreka Co.'s property to the north and higher up the mountain. The road of the Yreka Co. is used part of the way up, whence a trail has been built to the workings, with a heavy grade. The improvements this year have been principally on this trail, besides the building of two log-houses at the workings and the driving of a tunnel in on the lead. The ore is of similar nature to that of the *Yreka*.

WEST ARM.

Iron.

* The 13 claims owned by Messrs. Frank, Croft and others on the West arm have received some development work this year. The deposit is a bog ore carrying a good percentage of iron. The owners appear to be well satisfied with the result of this year's work.

The coal property owned by the West Vancouver Coal Co., located on Coal harbour, has not been worked this year.

TETA RIVER.

Considerable work has been done on all the properties along this river, which comes into the South-east arm from the south, about five miles above Yreka. On the *Paystreak* claim 50 feet of tunnelling has been done, and the *Teta Group*, owned by Messrs. Nordstrom, Sorenson and others, is being steadily developed by the owners, another 30 feet of drift being expected to tap the well-defined lead showing above. Substantial buildings have been put up and trails made, showing the owner's good faith in the future of the property.

KLASKENO INLET.

The *Mexican Group* of claims, owned by Messrs. Clark, Gwin and Lea, have received some work upon them this year, a large body of iron pyrites, with some copper, having been developed. Klaskeno inlet is about 15 miles to the south of the entrance of Quatsino sound and is well nigh inaccessible for small boats in the winter season, so that, until a sufficiently large camp is established to induce the regular steamer to call, the district cannot progress to any extent. Some new claims have been recorded in this vicinity.

OFFICE STATISTICS—QUATSINO MINING DIVISION.

Free miners' certificates issued, individual	74
Free miners' certificates, companies	2
Mineral claims recorded	99
Certificates of work	58
Transfers	20

Receipts.

Free miners' certificates	$550 00
Mining receipts general	342 50
	$892 50

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* *See* Provincial Assayer's Report on Quatsino Sound, p. 196 *et seq.*

QUATSINO SOUND.

Report of H. Carmichael, Provincial Assayer.

This sound is the most northerly of the deep inlets on the outer coast of Vancouver Island, and penetrates the latter in a north-easterly direction for upwards of 25 miles. The breadth at the entrance of the inlet is nearly 6 miles, narrowing to less than a mile at 5 miles within; the sound then runs in a north-easterly direction (magnetic) nearly straight for 13 miles, when it branches off in two arms, one extending to the south-east for 12 miles and terminating in low land, while the other arm lies to the north-west of the sound and is connected with it by a straight narrow pass (Quatsino narrows), some two miles long by one quarter wide. This latter, innermost branch of the sound runs in an east and west direction and is 22 miles long by some 2 miles wide. To the west of the narrows mentioned it is called the West Arm and runs to within 12 miles of San Josef bay, on the west coast of Vancouver Island, while that portion lying to the east of Quatsino narrows is named Rupert arm, its eastern extremity being only 6 miles in a direct line from the eastern shore of the island, with which it is connected by a trail 9 miles long. This trail runs through practically level country and affords an easy means of communicating with the steamers which ply on the East Coast.

The late Dr. Dawson made an examination of Quatsino Sound in 1885, principally to determine the extent of the coal-bearing area; his remarks, in so far as they apply to the metalliferous section, are here given:—

“Character of Shores.

“The shores of Quatsino sound are in general rocky and bold, with mountains, or high rocky hills, rising steeply from them. There is, however, a somewhat greater extent of sandy and gravelly beach than occurs in most of the inlets of the coast, and the mountains are not so closely crowded together as in many parts of Vancouver Island, there being considerable intervening tracts of low land, and wide valleys of which the terminations are not known, running back from its shores. Somewhat extensive areas of low country border the shores of Winter harbour, at the head of Forward inlet, and a wide tract of country, characterised by low rounded hills, exists on the south shore of the main inlet west of Limestone island, while other important low areas are found near Hecate cove, Coal harbour and Rupert arm. The quantity of good timber on these must be very considerable, and toward the upper part of the sound the Douglas fir—which is not seen along the outer coast of Vancouver Island—re-appears.

“The shores of Forward inlet are chiefly composed of rocks of the Vancouver series, but in part also of Cretaceous sandstones. On the east side of Robson island, and on the shores of the point to the north which separates the main inlet from Browning creek, there are extensive exposures of the flaggy argillites, which, though much crumpled and confused, and penetrated by a number of grey felspathic dykes, appear in the main to assume an anticlinal form, overlying a greenish-grey compact volcanic rock, and being overlaid by agglomerates, which are often well bedded, and sometimes have a rather tufaceous appearance. The argillites themselves present their usual black, flinty appearance, with regular and thin bedding where undisturbed, and are frequently more or less calcareous. The general strike of these and the associated altered volcanic rocks, is about north-west by south-east, but there are, doubtless, several folds and possibly other complications, as the argillites recur at two places on the shore to the east of and opposite the point above mentioned, and also at two places on opposite sides of Winter harbour, further up the inlet. The exposures of these argillites in Forward inlet afforded a considerable number of specimens of the Belonites, for which Mr. Whiteaves, in the appendix, proposes the name *A. Vancouverensis*.

"The north shore of Quatsino sound, from Forward inlet to Koprino harbour, exhibits a great series of the altered volcanic rocks of the Vancouver series. These show persistent south-westward dips, at angles of from 35° to 60°, but are probably repeated either by folding or faulting, as the thickness indicated would otherwise be enormous. The materials are principally agglomerates, of greenish or grey tints, but, occasionally, conspicuously red in colour. Amygdaloids also occur, but do not form so important a part of the whole. These rocks have been subjected to somewhat less alteration than usual, and the agglomerates frequently weather out into rough surfaces, with a scoriaceous appearance. The rocks of the south shore of the inlet, from Bold bluff to the west side of Koskeemo bay, of the chart, are similar, with similar dips. The west side of Koprino harbour is composed of similar greenish rocks, probably agglomerate, but on the east of the north-west cove a massive grey limestone, with a minimum thickness of about forty feet, appears, and is associated with hard sandstones and flaggy argillites of the same series, considerably disturbed and irregular. Beyond the next little cove, or creek, to the east the rocks of the shores and islands of Koprino harbour belong entirely to the Cretaceous series.

"Similar agglomerates and amygdaloids compose the south shore of the inlet, south of Limestone island, with the exception of the east side of Banter point, of the chart, where a small outcrop of limestone again occurs. Altered volcanic rocks of the same general character, and with similar persistent westward dips, form the greater part of the entire south shore of the inlet eastward to Village islands opposite Koprino harbour, together with Brockton island. On the east side of Village islands, the flaggy argillites re-appear, overlying well-bedded, fine-grained, felspathic rocks. The exceptional points on this shore consist of small outliers of Cretaceous sandstones, which may be regarded as portions of the southern edge of the Koprino Cretaceous area previously alluded to. The largest area of these rocks extends along the coast between Limestone and Brockton islands, for nearly two miles, with low dips generally off shore. The rocks are greenish-grey sandstones, and may extend for some distance to the south, as the land in that direction is all low. The exposures at the east end of this area show the sandstones passing into conglomerates, and in actual contact with the older volcanic rocks, filling hollows and crevices in their surface, which has been very irregular.

"The south-east arm of Quatsino inlet clearly follows the general strike of the rocks of the Vancouver series, and occupies a depression which has been worn out along the outcrops of the same bed of limestone which is noted in connection with Quatsino narrows and the east end of Limestone island. The bed dips in general south-westward at high angles all along the arm. Limestone is frequently seen along the east shore, and appears to rest on a green amygdaloid. At Long island, near the southern extremity of the arm, there are large exposures of flaggy argillites, which follow the limestones in ascending order and are often more or less calcareous. Obscure casts of Monotis or Halobia were seen in them in a few places. Further exposures of these argillites are found skirting the west shore of the arm nearly to its north end.

"The existence of the transverse hollow now occupied by Quatsino narrows is pretty evidently due to the softer character of a thick bed of limestone, which nearly follows the course of the narrows. A second bed, or possibly a repetition of the same bed, runs across a low country from Hecate cove to the south shore of the West arm, parallel to the first. The same limestone appears on the opposite side of the West arm, in large exposures to the west of Hankin point.

"The rocks of Rupert arm, with the exception of the Cretaceous previously alluded to, are generally reddish or grey felspathic materials, of somewhat doubtful origin, but referable to the Vancouver series. Limestones again outcrop at the points to the east of the entrance to

Quatsino narrows. All the western part of the south shore of this arm show no rock exposures, and from the low character of the country it is possible that the Cretaceous rocks of the Coal harbour area are continued in this direction."

SOUTH-EAST ARM OF QUATSINO SOUND.

All the mineral locations immediately adjacent to the South-East arm have been made on the range of hills which rise abruptly from the west shore of the arm, attaining a height of 2,000 feet. With the exception of Teta river, where quartz veins exist, the mineralisation seems to occur along the contact between large felspathic dykes and the limestone which forms a large portion of these hills. Along these contacts there are occurrences of garnetite, which usually marks a zone mineralised with copper and iron pyrites, and often of considerable breadth. The mineral would appear to have come up with the felspathic material and to have been deposited at or near the limestone contacts in a similar manner to the ore deposits at the north end of Texada island. The east shore of the South-East arm is largely limestone in which no mineral has been found, but on crossing the divide, on the slope towards Alice lake to the east, felspathic dykes are again seen, and here an extensive body of mineral has been found and located as the *June Group*.

Quatsino sound forms an inland body of water affording splendid facilities for prospecting, and after crossing an easy divide eight miles eastward from the South-East arm, two large lakes are reached, opening up a means of communication which penetrates into the very centre of the northern portion of Vancouver Island. These lakes have been named respectively, Alice lake, lying to the north and about 11 miles long, and Victoria lake, lying to the south and some 12 miles long. They have never been surveyed and their shores only partially prospected.

Yreka.

Some four miles up the South-East arm, on the west shore, is the wharf and post office of Yreka, where is also situated the Mining Recorder's office for the Quatsino Mining Division. A townsite has been laid out by the Yreka Copper Company, Ltd., which also has a store, saw-mill, blacksmith shop, large bunk-house, etc. Rising above the townsite, at an angle of 40°, is a peak, somewhat higher than the range, which has been named Comstock mountain and on which have been located two groups of claims, viz.:—the *New Comstock Group* and the *Superior Group*, both owned by the Yreka Copper Co., Ltd. The head office of this company is at Tacoma, Washington, and its Canadian office at Yreka. The properties mentioned are now being worked by the Northwestern Smelting and Refining Company under a tonnage contract, Mr. Long being the superintendent.

The *New Comstock Group* consists of eight claims, viz.: *Mountain Queen*, *Mountain King*, *Eva*, *New Comstock*, *Asa*, *Thor*, *U. S. Fractional*, *Yreka Fractional* and *Edith Fractional* mineral claims. The principal work has been done on the *New Comstock*. The *Superior Group* also consists of eight claims, viz.: the *Superior*, *Pocohontas*, *Tuscarora*, *Quatsino Chief*, *Mohican Fractional*, *Hiawatha Fractional*, *Ready Cash Fractional* and *Omega Fractional* mineral claims. Both groups have been surveyed and Crown grants are being applied for. The *Superior Group* lies further up the mountain than the *Comstock*, the principal work being done on the *Superior* claim, where a tunnel has been driven for 125 feet into a mineralised garnetite. Since these properties have been taken over by the Northwestern Smelting and Refining Company, work has been confined to the *New Comstock Group*. From the wharf a waggon road zig-zags up the mountain to the mine camp, which is reached at an elevation of 1,050 feet above sea level. At this point is also located a ten-drill air compressor, operated by a arge size Pelton wheel under a head of 400 feet. Three machine drills were being run when the property was visited in July. An aerial tram runs from the level of the camp to the bunkers near the beach, and from the upper terminal two baby trams run to the workings, some 200 feet higher.

The ore, which is copper pyrites carrying small gold and silver values, occurs largely in a mineralised garnetite, forming a zone about 150 feet wide with an approximate strike of N. 40° W. and dipping 45° to the south-west, the country rock being a light-coloured * felsite, and it is probable that the mineral came up with these felspathic dykes and was deposited in contact with limestone, at the same time decomposing the latter and forming garnetite; this seems more probable since limestone was noticed in several places in the drifts and also further down the mountain, as well as on the *Edison Group*, adjoining to the north; there is also a large quantity of secondary calcite to be seen in the drifts.

About 400 feet behind the camp and 200 feet above it, a body of ore has been stoped out near the surface, leaving a chamber about 60 feet long by 30 feet wide. This represents the bulk of the ore which has so far been shipped from the mine. The ore supply at this point having been worked out, a prospecting shaft was sunk for 30 feet just outside the stope, but as this was still in the felsitic country rock it was decided to abandon it and run in a long drift further down the hillside. This was accordingly done and No. 1 tunnel has been run directly into the hill 186 feet below the upper stope and tunnel, which is known as No. 2.

No. 1 tunnel was run in for 140 feet through felsite, when a bunch of ore 25 by 20 feet was struck and mined. The drift then turns with a deflection of 40° to the left and runs for 100 feet through felsite, when it takes a turn of 36° to the right and continues for 170 feet to the face. This latter portion of the drift has been driven along a slip fissure, filled with crushed rock cemented together with calcite. Forty-five feet from the face a small cross-cut was run to the right for 20 feet and is in felsite. The general direction of No. 1 tunnel is S. 50° W., running directly into the hill, and at the face it is nearly vertically below No. 2 tunnel.

When the property was taken over by the North-west Smelting and Refining Co., a drift was started from the point in No. 1 tunnel where the small body of ore was struck and was run at 90° to the right to get below a showing of ore seen on the surface 200 feet to the right. When the property was visited this drift was being worked by a machine drill and was in 100 feet, having still another 100 feet to run before ore could be expected. For the first 45 feet the right wall of the drift is a garnetite mineralised with copper pyrites, the rest of the drift being in felsite.†

Above No. 1 tunnel, from the stope referred to, No. 2 tunnel is being driven in the same direction as No. 1, and is in 111 feet from daylight, running through felsite with lime showing in places.

Some 20 feet above No. 2 tunnel and 111 feet to the right, a short tunnel, No. 3, was run to prospect a surface showing of fairly well mineralised garnetite 150 feet wide and dipping at an angle of 45° into the mountain. To prove this ore body with depth, a drift is being run from the stope in No. 2 tunnel to the right, and early in July was in 100 feet, being worked by a machine drill; it was estimated that 30 feet further would require to be driven before ore would be reached. At 60 feet in a small patch of ore was cut, passing into felsitic rock, in which the machine was still working.

To the right of the waggon road and a short distance below No. 1 tunnel, an open cut was made into ore similar to that mentioned above.

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* *See* Rock Samples 20, 21, 22, 23 (8A, 8B and 9A, 9B), Appendix.

† *See* Rock Sample No. 16 (No. 4), Appendix.

There is a considerable mineralisation on the surface of the property, which will prove valuable if shown by the development work now in progress to continue with depth.

Edison Mineral Claim.

The *Edison* claim adjoins the *Superior* claim of the *Yreka Group* to the east, and is reached by trail from the Yreka wharf. The property is owned by the Edison Mining Co., Ltd., having its head office in Tacoma, with an agent in Victoria. The property has been surveyed and a Crown grant will be applied for in the fall. The claim is situated on the same range as the *Yreka Group*, sloping into the south-east arm at an angle of 40°, and being reached at an altitude of 2,275 feet. A gulch running down the mountain side cuts through a zone more or less mineralised for 100 feet wide and having a strike of N.E. and S.W. On the northerly side of the gulch several open cuts and some surface stripping show a mineralisation of the rock matter, with pyrrhotite and copper pyrites, for a width of six or eight feet, the gangue matter being a dark green igneous rock. Outside of this gangue there is a felsitic* rock much altered and vitrified by heat. Ninety feet below the open cuts a tunnel is being run in from the gulch to strike the ore shown by the cuts, and it has only a few feet to run before it gets below the surface work above. The country rock in the tunnel is slightly mineralised with copper pyrites, and appears to be of the same general character as on the *Yreka* claim, but lime occurs 500 feet further down the gulch and is traversed by igneous dykes. There is a small showing of good ore on a contact between blue limestone and one of these dykes.

TETA RIVER.

Teta river is a small stream flowing into the south-east arm on its western shore, five miles south-east from Yreka.

The *Red Rock* mineral claim has been located near the mouth of the Teta river, a quarter of a mile back from salt water and at an altitude of 100 feet. The owners are Paul Cramer, Fred Pollock, *et al.* A few shots have exposed 10 feet in width of solid pyrrhotite, occurring between diabase walls, the rock in the creek bed being, however, more felsitic in character. An assay of the ore only showed traces in gold, silver and copper.

The *Paystreak* mineral claim is situated three-quarters of a mile up Teta river, at an altitude of 125 feet. The creek at this point flows through a narrow canyon with perpendicular walls. On either wall is seen a small quartz vein, with a strike N. 80° W. and nearly vertical dip. From the west wall of the canyon a tunnel has been run in on the vein a distance of 50 feet, showing a lead, in places 8 or 9 inches wide, mineralised with copper pyrites. The country rock,† which is a quartzless porphyry, is much altered near the vein and is frozen to the quartz. An assay of the ore gave :—Gold, .01 oz. ; silver, 1 oz. ; copper, 10.88 %. The owners are Paul Cramer, Fred. Pollock, *et al.*, Yreka.

White Quartz Mineral Claim.

The *White Quartz* claim is on the Teta river watershed, a short distance up the right bank of the stream, being reached at an altitude of 1,050 feet, and about one mile back from salt water. The owners of the claim are G. Sargison and Chris. Nordstrom, of Quatsino. An outcrop of brecciated white quartz, about 21 feet wide, is seen on the surface, having an approximate strike of N. 25° E. and dipping nearly vertical. About 30 feet below this outcrop, a tunnel 100 feet long has been run into the hillside, and at 24 feet in cuts diagonally a small quartz stringer 3 inches wide, clearly defined, with gouge on either wall, and fairly mineralised with copper and iron pyrites. For the next 12 feet the tunnel is in felsitic country rock,‡ when another

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* *See* Rock Sample No. 19 (No. 7), Appendix.

† *See* Rock Sample No. 13 (No. 1), Appendix.

‡ *See* Rock Sample No. 14 (No. 2), Appendix.

YREKA MINE, QUATSINO WHARF AND LOWER TERMINAL.

YREKA MINE, QUATSINO—MINE BUILDINGS.

small quartz stringer is crossed, having about the same strike as the former. The tunnel is then for 10 feet in country rock until a quartz vein about 2 feet wide is reached, dipping 55° northward. The ground at this point shows much movement and twisting. The tunnel then swings around to the left, brecciated quartz being noted on the right side, while at 50 feet in it cross-cuts a dyke of fine-grained rock. From this point the tunnel continues to swing to the left until it is nearly semi-circular in form, and from the dyke to the face, some 27 feet, is in country rock. At the face the same brecciated quartz noted on the surface is to be seen, though in the tunnel generally it does not show up to nearly such an extent as seen above. The quartz is mineralised with some copper pyrites, but the principal values are said to be in gold. Though the samples assayed in the Government laboratory showed low gold values, it is stated by the owners that payable quantities of that metal are to be obtained.

June Group.

The *June Group* consists of five claims, namely:—*Amazon*, *Helen*, *June*, *Olga* and *Iron Knob*, owned by the Copper Mountain Mining and Development Company, of Tacoma, Washington. This group is reached by a trail starting from the north-east shore of the south-east arm of Quatsino sound, about 3 miles above Yreka. The trail is some 6 miles long in an easterly direction, gradually rising to a height of 800 feet, then dropping down again to the camp, at 400 feet altitude, in a distance of 1½ miles. Except for the rapid descent to the camp, there would be no difficulty in putting in a tramway from salt water. The *June* camp is the centre from which trails branch off to other claims. The few rock exposures seen on the trail were of blue limestone. The claims run east and west, the principal work being done on the *June*. In the centre of the claim the ground rises in a rather rounded ridge. On the western end of this ridge two prospectors located an outcrop of magnetic iron. The property was bonded from these prospectors by the Copper Mountain Mining and Development Company, of Tacoma. This company started development by an open quarry at the western end of the ridge mentioned. This has now exposed a face 48 feet wide by 36 feet high. The mineral-bearing material is a porphyritic hornblende granite,* mineralised with copper pyrites and bornite, and also mixed with solid magnetic iron, while copper pyrites and bornite are also finely disseminated through the iron ore. The ore occurs irregularly on the face of the bluff, and in places has a brecciated structure, having streaks of crystalline quartz and calcite through it; in fact, the vein-matter is more silicious than has been noted in other deposits of a similar nature on Vancouver Island.

While not proven by continuous work, outcrops were seen some 250 feet to the north of the quarry, which would place the probable width of the mineralised zone at 300 feet, though it is likely that the amount of mineralisation might vary considerably in this distance. The mineralised ridge extends to the end of the *June* claim and through the *Helen* claim adjoining, being proved by a number of open cuts and prospect holes, some 20 in all. These, in all cases, have shown magnetite, generally impregnated with a little copper pyrites. This gives a length for the mineralised zone of about 3,000 feet. At the face of the quarry the rock on the right or south is silicious, while that to the north is more basic. Near the centre of the quarry felsite about 6 feet wide is seen. The ore and vein-matter show irregular cooling fractures all through the mass. Above the quarry, 37 feet back from the face and a little to the left, an open cut has been run in from the north side of the ridge a distance of 18 feet, attaining a depth of 12 feet. This cut is all in ore, which is magnetite with a considerable mixture of copper pyrites and bornite.

In this part of the country there are very few rock exposures to be seen, but the mineralisation appears to occur between lime on the north and granite to the south, a comparatively narrow band of felsite or felsitic dyke intervening between the granite and the ore body, the latter probably being formed at the time of the granitic upheaval.

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* *See* Rock Sample No. 18 (No. 6), Appendix.

Flowing through the *Amazon* claim, which adjoins the *Helen*, is Link creek, which has a fall of 70 feet from Victoria lake, affording ample power for mining operations. There is also an unlimited supply of suitable timber for mining purposes. There is undoubtedly a large mineralised area on this group, and its value as a workable property will depend on the nature of such mineralisation shown by further development work. The general country rock of the district is a hornblende granite.*

The management state that an assay of an average sample of the ore taken from the face of the quarry gave gold $1.80, silver 1 ounce, and copper 3.3 %, which appears to be justified by the look of the ore and sample assayed in the Government laboratory, though picked ore would run much higher. The value of the ore is helped considerably by the gold content, which is probably carried by iron pyrites in a quartz vein matter, which was noted at different points on the property.

Peerless Mineral Claim.

The *Peerless* mineral claim is situated to the east of the *June Group*, on Murray creek, on the western end of the range separating Alice lake from Victoria lake. Link creek flows round the north-western base of the mountain from Victoria to Alice lake. After crossing Link creek from the *June Group*, and at the eastern end of a slight ridge, open quarry work has exposed an ore body 30 feet wide of nearly solid zinc blende, mixed with a little quartz vein matter. The lead runs N.W. and S.E., dipping 60° to the north; the hanging-wall is diabase and the foot-wall limestone. The quarry shows a face of ore from 9 to 10 feet high. Some prospect holes have been sunk on the ridge 200 feet to the west of the quarry, the mineral at this point being principally arsenical iron in a quartz, with some blende. The claim is owned by Julian Sutro, of Quatsino.

Elk Mineral Claim.

Adjoining the *Peerless* to the east is the *Elk* mineral claim, owned by J. L. Leeson, of Quatsino, and located in the spring. A small prospect hole shows some blende and galena occurring between lime and diorite.

The *I. X. L.* mineral claim adjoins the *Elk* claim to the east and is owned by Samuel Bryce, of Quatsino. The lead is an extension of the *Elk* lead and shows the same mineralisation.

WEST ARM OF QUATSINO SOUND.

A number of claims were located for copper on the West arm and some little work done, but now all have been abandoned, with the exception of the iron properties. One or two of the former were visited, but nothing seen worth noting.

Iron Ore.

The deposits of iron ore* are situated on the north side of the West arm, nine miles west from Coal harbour; the deposits are owned by the Iron Mountain Syndicate of Victoria. The property consists of eight claims containing limonite, and five containing bog iron. A series of bogs, one and a half miles long and extending back from the north shore of the arm, form the basin where these deposits of bog iron occur. The bogs are drained by a small creek flowing into the arm and named Indian creek. These deposits have been prospected by holes sunk at different points.

On a range of hills to the north-west of the bogs lie the limonite deposits, one of which, on the *Sunrise* claim, one mile back from salt water and at an altitude of 400 feet, was examined. On this claim a small creek runs through a limonite deposit, exposing it for a considerable distance. The deposit has also been prospected by a number of open cuts and holes.

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* *See* Rock Samples Nos. 24 and 25 (Nos. 10A and 10B), Appendix.

* *See* Rock Sample No. 15 (No. 3), Appendix.

To get an intelligent idea of the extent of these deposits, or to form any estimate as to the probable tonnage, would require a detailed survey of the whole property, together with careful prospecting; but there is enough ore on the surface to warrant parties interested in the iron industry making a careful examination of the property; the ore is well situated for easy and cheap transportation to navigable waters.

MARBLE CREEK.

An examination was made for a short distance up Marble creek, by which Alice and Victoria lakes drain into the West arm of Quatsino sound.

At the mouth of the river a series of grass flats extend for a mile; above this the stream flows through a narrow canyon of blue limestone for over half a mile, the walls rising perpendicularly on either side for from 50 to 150 feet in height, out of the dark water of the river, by which they are cut into small caves and fantastic shapes, clothed with maiden-hair fern and hanging cedar, making this canyon of Marble creek as beautiful a spot as is to be found on Vancouver Island. The river is navigable for canoes nearly to the head of the canyon, but from this point there are several rapids and a waterfall, giving a head in all of 20 feet. A rough estimate of the flow of water was made on the 18th of July, and it was placed at 21,000 cubic feet per minute. The creek does not appear to be suitable for the development of power, owing to the difficulty and expense of construction offered by the canyon. There is another fall near Alice lake, about six miles from the sea, the total elevation of Alice lake above salt water being estimated at 100 feet.

NANAIMO DISTRICT.

NANAIMO MINING DIVISION.

REPORT OF MARSHAL BRAY, GOLD COMMISSIONER.

I have the honour to submit my annual report on the mining operations in the Nanaimo Mining Division for the year ending the 31st of December, 1903.

There were 514 mineral claims in good standing at the end of the year, and while less locations were recorded for 1903 than in previous years, a good deal of development work has been done, giving in many instances very gratifying results. This Mining Division and the Coast mines generally are easy of access, and, consequently, are convenient for personal examination, while the low cost of working, the cheapness of labour, fuel and supplies, and the permanent nature of the deposits, as inferred from development work done, are all good and sufficient reasons why capital should find a remunerative investment in this extensive area.

TEXADA ISLAND.

Marble Bay. The *Marble Bay* mines have shipped during the year to Ladysmith and elsewhere about 15,000 tons. The development work done for the year consists of sinking the shaft 100 feet deeper, making the lowest level 460 feet from the surface, with drifting and cross-cuts 376 feet. New plant installed includes one Lidgerwood hoisting engine, new sorting tables and ore-bin at the mine, while a new machine shop has also been erected. The average number of white men employed for the year was 36, with 4 Chinese ore sorters. Labour troubles interfered with the operation of the mine and delayed development work for some time. A large body of ore has been exposed at 140 feet from the shaft on the 460-foot level, and in the main north level the ore is of high-grade, and it is very encouraging to learn that the copper values have steadily increased with depth.

Van Anda. The properties held by the Van Anda Copper & Gold Co., Ltd., have been exploited during the year and the *Cornell* and *Copper Queen* mine are now steadily shipping ore to the Ladysmith smelter. The main shaft of the *Cornell* has been sunk from the 360-foot level to the 560-foot level, and development comprises 636 feet of drifting, 71 feet of winzes and 200 feet of raises. A tramline has been built connecting the mine with Van Anda bay, where a 200-ton bunker has been built. Ore shipments began in July, the total output for the year being 3,279 tons. The ore in this mine is also improving with depth.

On the *Copper Queen* the development work done includes drifts, 103 feet; raises, 25 feet; winzes, 124 feet. A new hoist has been installed at the surface and the old hoist lowered to the head of the winze at the 500-foot level. A small Cameron pump has been placed at the 100-foot level and a sump cut there to catch the surface water; an auxiliary vertical boiler has been placed in the boiler-house, and a two-compartment bin and ore-chute, to hold 180 tons, has been built and connected by a spur line with the main tramline from the *Cornell* mine. Ore shipments began in July, and the total shipments for the year were 806 tons. The average number of men employed for the year in these two mines was 35.

The Puget Sound Iron Company's mines have shipped 2,290 tons of iron ore to Irondale, and have shipped 125 tons of copper ore to the Ladysmith smelter. This latter ore gave good values in gold and silver. The development work done for the year was 300 feet of tunnel driven into the hill, and the average number of men employed was 10.

The *Loyal* mine has been leased to an American syndicate, which has installed a small hoisting plant and has done considerable development work on the property, taking out some very rich bornite and chalcopyrite ore from the shaft. It is the intention to fully develop the property this coming year.

The *Nutcracker* claim was worked during the fall months and some very rich ore containing free gold was taken out.

The Cordillero Company, of Seattle, has run a tunnel 120 feet on its properties during the year, and intends to push the same forward to the objective point. Some fair returns were got from the rock cut through by the tunnel.

Many other claims have had considerable development work done during 1903, and the coming year promises to be a prosperous one for Texada island.

The mineral claims situate on Phillips and Frederick arms and Thurlow and Valdes islands have not had much more development work done during the year than was necessary to keep them in good standing.

Considerable work has been done in Dunsmuir, Bright and Oyster Districts during the year, with gratifying results.

The mineral claims located and recorded during the year ending 31st December, 1903, are situate in the following places throughout the Nanaimo Mining Division, viz. :—

Texada Island	101	claims recorded.
Valdes Island	14	"
Harbledown, Maud, Thurlow and Gowland Islands	8	"
Tatlaco Lake	1	"
Knights Inlet	1	"
Loughborough Inlet	4	"
Pryce Channel	2	"
Horne Lake	2	"
Robson's Bight and Port Neville	2	"
Bright District	10	"
Dunsmuir District	4	"
Oyster District	2	"
Nelson District	7	"
Kla-anch River	1	"
Menzies Bay	2	"
Total	161	"

OFFICE STATISTICS—NANAIMO MINING DIVISION.

Individual free miners' certificates issued	227
Companies " "	6
Mineral claims recorded	161
Certificates of work recorded	183
Certificates of improvements recorded	26
Crown grants applied for and issued	26
Bills of sale recorded	29
Permissions given to re-locate	2
Rental for mining lease	1

The revenue collected for the above free miners' certificates and mining receipts generally for the year ending the 31st December, 1903, was $4,532.85, being $198.70 in excess of what was collected for the year ending 31st December, 1902.

VICTORIA DISTRICT.

VICTORIA MINING DIVISION.

REPORT OF GRANVILLE CUPPAGE, MINING RECORDER.

I have the honour to submit herewith the annual report on mining operations in this Division for the year ending 31st December, 1903.

I have to thank Mr. E. J. Hearn, of Duncans, for the interesting report on the Tyee and other claims in the Cowichan and surrounding districts.

MOUNT SICKER.

Tyee Mine.

The work on the property of the Tyee Copper Company, Ltd., at Mount Sicker has been very extensive during 1903. The 100-foot level has been extended a further 504 feet, making a total of 896 feet. The 165-foot level has also been extended 494 feet, and is now 695 feet in, and the 300-foot level 611 feet, making 636 feet. The work done during the year has been of a most satisfactory character, and the ore reserves have been largely added to. At the present time the known ore reserves are sufficient to ensure a supply of 5,000 tons per month for the next two years, and simultaneously with the work of extracting the ore, heavy and continuous development is being carried on. The underground workings at the *Tyee* mine now exceed two miles in extent, and the ore bodies have been proved to exist right through, from the west to the east boundary lines, a distance of 1,500 feet. The average width of these ore bodies is over 20 feet, and some of the stopes have shown a width of 45 feet of clean, solid ore. Since the erection of the aerial tramway, in October, 1902, over 50,000 tons of ore have been shipped to the Tyee smelter at Ladysmith, and recently the capacity of the tram has been doubled, so as to keep pace with the output of the mine. Further timber lands have been purchased from the E. & N. Railway, and the company now holds 600 acres, conveniently situated for hauling the timber to the mine. The smelter at Ladysmith has worked most successfully during the year under review. During the 12 months 42,000 tons of *Tyee* ore were treated, producing 4,498 tons of matte, containing 3,604,474 lbs. of copper, 121,932 ozs. of silver, and 6,620 ozs. of gold, the value of which, after deducting refining charges, amounts to $562,890; and in addition to this a large tonnage of custom ores has been treated.

NOTE BY THE PROVINCIAL MINERALOGIST.—A full report of this company's mine and smelter will be found in the Report for 1902. The following extracts from the report of the mine superintendent, Mr. E. C. Musgrave, to the Directors in April, 1903, give an idea of the cost of mining in this camp :—

Wages paid.

Under-ground :—			
Machine miners	$3 50	per day of	8 hours.
Miners (hand drillers)	3 00	„	„
Timbermen	3 25	„	„
Muckers and trammers	2 50	„	„
Above-ground :—			
Carpenters & timber framers, loggers, mechanics, hoist-engineers and blacksmiths	3 50	„	9
Surface hands (white)	2 50	„	10
„ (Chinese)	1 00	„	10

Cost of Mining per Ton of Ore Shipped.

Stoping	$1.359	per ton.
Proportion for exploration	.499	"
Surface work	.124	"
Ore sorting	.041	"
Transportation to railway (aerial tram)	.150	
Total cost of ore delivered at E. & N. Railway	$2.173	

The total amount of development work done during the (fiscal) year has been: Drifting, 1,095 feet; cross-cutting, 511 feet; sinking, 193 feet; upraising, 319 feet. The average costs per lineal foot have been: Drifting, $9.15; cross-cutting, $6.77; sinking, $18.31; upraising, $11.59.

The total tonnage of ore delivered to the smelter during the period under review was 21,565 tons, of which 20,688½ was first-class ore, and 877 tons copper-bearing schists (for flux). Of the ore, 2,930 tons were sent from the dump and 17,758½ tons from the mine. The assay values of the ore are given in the report of the smelter.

[Smelter Report.

The report of the manager of the smelter at Ladysmith, Mr. Thos. Kiddie, is exceedingly interesting from a metallurgical standpoint, as showing the practical results obtained in smelting an ore carrying over 35 % of barium sulphate, a problem, as far as can be learned, not met with outside of this camp. The following figures show the results of the first few months run on this ore, which, as just intimated, is unique in character, and concerning which no previous results were obtainable as a guide; consequently, as must be recognised, the work was largely experimental:—

Ore Receipts from September 22nd, 1902, to April 30th, 1903.

Copper-bearing ore (roughs)	15,060.725	tons.
" (fines)	5,173.785	"
Total	20,234.510	"

The average assay of this ore was:—

Copper (wet assay)	4.43 %	
Silver	2.76	oz. per ton.
Gold	0.12	"

Other receipts were as follows:—

Schistose flux ore	1,340.9	tons.
Sandstone	396	"
Iron ore	551	"
Coke	2,346	"

Burnt Ore.—The average analysis of the burnt ore delivered to the smelter was as follows:—

Iron	10.44 %
Zinc	8.14 "
Alumina	3.61 "
Barium sulphate	34.08 "
Magnesia	trace.
Lime	3.46 %
Silica	22.51 "
Combined sulphur	7.42 "
Total sulphur	13.86 "

During the last quarter of the year (fiscal) the burnt ore showed on analysis an increase of:—Iron, 1.86 %; zinc, 0.93 %; barium sulphate, 7.66 %; lime, 0.5 %; combined sulphur, 0.54 %; and a decrease in silica of 11.49 %.

Smelting Operations.—The furnace "blew in" on the 16th December, 1902, and had run 107 days (of 24 hours) and smelted as follows:—

Burnt ore	13,853.841 tons.	16,091.465 tons.
Green ore	2,237.624 "	
Schist		539.636 "
Silica flux		774.687 "
Slag		338.108 "
Iron ore		301.653 "
Matte		963.818 "
Total mixture		19,009.367 "
Coke used		2,116.313 long tons.

Showing an average per day of 150.387 tons of ore, or 177.657 tons mixture. The ratio of coke to ore was 1 to 7.428, or of coke used to burden 1 to 8.775.

The matte produced in 107 days' run amounted to 1,394.3 tons, showing an average assay of: Copper, 41.95 % (dry); silver, 29.67 oz. per ton; gold, 1.483 oz. per ton. The yield per ton of ore was:—

Copper (dry)	3.63 per cent.,	valued at	11.5 cents per lb. =	$8.349
Silver	2.57 oz. per ton,	"	50.82 " oz. =	1.306
Gold	0.128 "	"	$20.00 " oz. =	2.576
Yield value per ton of ore				$12.215

Slags.—The following is the average analysis of the slags produced:—

Copper	0.65 %
Iron	15.71 %
Silica	28.79 %
Alumina	11.51 %
Zinc oxide	10.43 %
Barium oxide	30.55 %
Calcium oxide	3.38 %

Experience and experiments with the ore have materially improved the practice. Mr. Kiddie has kindly furnished me with the following absolute average figures of the results of the last six months' work. He says, under date 29th April, 1904:—

"Answering yours of the 27th instant, I herewith enclose a statement covering the smelter operations during the last six months. During this time the furnace was in blast 123 days of 24 hours each, an average of 20 days per month, and smelted 30,703 tons of material, of which 28,290 tons were ore, making a daily average of 249.6 tons of material and 230 tons of ore per day, from which we shipped in the form of matte, 2,275,997 pounds of copper, 72,207.8 ozs. of silver, and 4,592.18 ozs. of gold. A general analysis of the burnt ore used during this period is as follows:—

Fe %.	SiO_2 %.	Zn %.	$BaSO_4$ %.	S (in Sulphides) %.
11.45	19.36	6.97	38.87	6.56

While the general analysis of the slags produced during this period, which also includes custom ores, was as follows:—

Cu %.	Au. oz. per ton.	Ag. oz. per ton.	FeO %.	ZnO %.	BaO %.	CaO %.	SiO_2.	Al_2O_3 %.	MgO %.
.37	.12	Trace.	17.68	6.44	26.16	7.92	33.34	10.75	Trace.

"The improvement in the slag assays for copper over the previous year is due in part to the increased settling capacity of the receivers at the furnace; in part to a reduction in the specific gravity in the slags by the admixture of suitable fluxing ores, which were not procurable in the earlier stages of our operations; in part to the lesser amount of ZnO in the slags, as a result of the admixture of other ores referred to; and in part to altered furnace practice, as a result of experiment with such ores. The specific gravity of the mattes was between 4.7 and 5.0, and of the slags between 3.6 and 3.8.

"Of the total ore smelted, 62.8 % was burnt ore, 22 % raw sulphide ore and 15.2 % raw custom ore—or 62.8 % burnt ore and 37.2 % raw ore, from which a shipping matte of from 40 to 45 % copper was produced in one smelting operation. Comparing the furnace work of the past six months, as shown above, with the last annual statement (the figures previously given), it will be seen that the capacity of the furnace has been raised from 177 tons to 249.6 tons, an increase of 72.6 tons per day."

THE VANCOUVER ISLAND MINING AND DEVELOPMENT CO., LTD.

This company, the offices of which are in London, Eng., has recently secured the option for two years on a large group of claims on Mount Sicker to the east of the *Tyee*, and work has been commenced on the *Westholme* claim. Suitable machinery has been purchased, including air compressor and drills, hoisting engine, &c., so that the development of the property will be pushed forward with expedition and economy. It is the intention to sink a shaft to a depth of at least 500 feet, and to thoroughly explore the ground. The necessary buildings, &c., are now being erected, and the coming spring should see the work in full swing.

Richard III.

The Richard III. Mining Co.'s property, which lies to the east of the Tyee mine, has been vigorously developed during 1903, with most encouraging results. The president and manager is Mr. C. H. Dickie, and the superintendent, Mr. W. C. Rannalls. During the year the shaft, which has two compartments, has been sunk to a depth of 500 feet, with a 10-foot sump. Five levels have been run, the amount of driving being 1,180 feet, with 354 feet of cross-cuts, and upraises 137 feet, making a total of 2,181 feet. This work has been done at a cost of under $10 per foot, including buildings, hoisting engine and boiler, and all executive expenses. Ore has been found on each level, but the best values so far have come from the 500-foot level, from whence a ton of ore was taken and shipped to the Tyee smelter, at Ladysmith, as a trial shipment. This gave a result of 3.29 % copper, .66 gold and 25.85 ozs. silver per ton. The work is being energetically pushed on, and the executive hope to commence shipping ore to one of the local smelters by the middle of January (1904).

The *Lenora* mine will be found fully reported on in last year's Report, since which time there are no new developments of importance. A large proportion of the dump was sent to the Crofton smelter and work has been carried on in a small way.

KOKSILAH RIVER.

A number of promising claims have been staked in this district, and on some a fair amount of work has been done on iron-capped, copper-bearing material. The copper-bearing zones appear to run along the contact of an eruptive rock and limestone, the latter containing in places considerable quantities of volcanic breccia and ash.

The *W. A. E.* claim, on the Koksilah river bank, has been prospected by two large open cuts, put in on a vein of quartz carrying zinc and copper, apparently at the contact of the chert and limestone, as shown in the No. 1 cut by the river. In the No. 2 cross-cut, however, about 600 feet distant, a dyke of very decomposed eruptive rock has been exposed, lying parallel and close to the vein, which in this cut shows hardly any quartz, the copper being found in garnet rock with actinolite and epidote. An assay of this ore gave a result of 26 % copper and $1 gold per ton.

The *Wallace* and *Copper Hill* claims are situated to the west of the *W. A. E.*, away from the river, but on parallel lines, and show copper at chert and grano-diorite contacts.

The *Blue Bell* claim lies about one mile west from the Koksilah river, and is owned by Messrs. Maclay & Ryan. More work has been done on this claim than on those previously mentioned, a tunnel having been driven in a distance of about 60 feet. This was commenced on a strong iron capping, which, on being broken into, disclosed a small but very rich vein of chalcopyrite lying rather flat. This forms the roof of the tunnel for some distance, but appears to be dipping easterly, as at the end of the tunnel, which is not carried straight but has a bend towards the east, the vein is nearly perpendicular on the east wall. Assays from here have given 29 % copper, with low values in gold and silver.

Another claim, the *Solomon*, held by the same parties and adjoining the *Blue Bell* on the west, also shows a rich outcrop of chalcopyrite, covered by an iron capping.

The *Dora* and *Mabel* claims lie to the north-west of and adjoining the *Blue Bell*, and are both located on a large showing of deep red and brown decomposed iron-bearing rock, in places covered with an iron cap composed of soil and gravel cemented together with the iron, and in other places decomposed for 2 feet in depth into soft limonite-looking material. Limestone outcrops are found on the *Mabel* claim, near the contact of the grano-diorite; pyrolusite and specular iron, both float and in place, are also found on this claim. A small open cut on the *Mabel*, through the iron cap and near the limestone, shows copper-bearing rock, but a considerable amount of work would be required to prove what underlies this extensive outcrop of mineralised rock. The face of the mountain here is very steep, and one foot in two could be gained by tunnelling. Assays of ore from this claim have given 12.32 % of copper.

The prospects so far opened up in this district have been most encouraging, and fully warrant further expenditure of labour and money.

QUEEN CHARLOTTE ISLANDS.

NOTE BY THE PROVINCIAL MINERALOGIST.—Mr. W. D. Verschoyle has kindly supplied the following notes on the Queen Charlotte Islands. The information was not received until the printing of this Report was nearly completed, and therefore could not be put in its proper place under the Skeena Mining Division. As, however, the latter division is under the jurisdiction of the Victoria Gold Commissioner, Mr. Verschoyle's notes are inserted here. He says:—

"*Coal.*—An offer has been made for the coal lands near Skidegate by American capitalists, who wish to begin active boring operations at once. It is doubtful, however, whether satisfactory arrangements can be made with the owners.

"*Mineral Claims.*—Sheldon's claim, situated about 12 miles south of Skidegate, on the east side of the islands, shows up well in gold and silver, with small copper values. It appears to be essentially a gold ore, and is different in character to most of that observed. Active work is contemplated.

"Heino's mine, on Copper island, has had considerable work done upon it, and a tramline and small wharf have been erected to facilitate shipping. A trial shipment of about 25 tons has been made, and if the results are satisfactory shipping will be continued. The ore is a large body of limestone, containing considerable chalcopyrite and iron pyrites.

"The Skincuttle island mine (Law's mine) has had a good deal of development work done in the way of shafts and open cuts, showing up some nice chalcopyrite in a calcite matrix, while on the south side there is considerable garnetite.

"On the Burnaby island mine (Law's) there are some large low-grade ore bodies containing chalcopyrite, on which a shaft has been sunk and some open cuts made. There is also a smaller vein of nice-looking chalcopyrite, which follows a diorite and limestone contact.

"The George island mine (Law's) is a recent discovery and but little work has been done on the property. There are several large blocks of ore showing, containing chalcopyrite, malachite and azurite in a calcite matrix.

"On the Rose harbour claim (Law's) chalcopyrite occurs in a calcite matrix at a limestone and diabase contact. Active operations are in progress for the purpose of testing the body of ore by means of a 50-foot shaft and cross-cut.

"Other small ore veins have been found both on the east and the west side of the islands, but little has been done to test their value. Yonal's claim, near Skedan, on the east coast, contains a preponderance of zinc blende, but sufficient work has not been done to prove whether this will be characteristic of the whole vein or whether its width and continuity will justify its operation for the production of zinc alone.

"*Slate.*—Overlying some of the earlier Cretaceous rocks there is a bed of shale or slate, which is easily cut when mined, but soon hardens on exposure to the air and takes a fine polish. It is much used by the natives for making small totem poles and other curios, for which there is a ready sale. This rock should have considerable value for interior decorative work and as mantelpieces and panelling."

OFFICE STATISTICS—VICTORIA MINING DIVISION.

	1901	1902	1903
Free miners' certificates issued	874	1,029	667
" " special	12	5	16
Mining claims recorded	345	273	150
Placer claims recorded	5	5	4
Certificates of work issued	277	462	344
Certificates of improvements issued	15	41	59
Grants of water rights for mining	5	3	4
Conveyances recorded	145	142	114
Abandonments recorded	4	1	...
Placer leases issued	2	4	3
Permits recorded	3	7	6
Lay-overs recorded	..	2	2

Revenue derived.

	1901	1902	1903
Free miners' certificates	$6,488 65	$7,307 10	$5,518 75
Mining receipts general	2,892 35	5,244 05	3,878 85
	9,381 00	12,551 15	9,397 60

NEW WESTMINSTER MINING DIVISION.

REPORT BY D. ROBSON, MINING RECORDER.

I have the honour to forward for your information the following report of mining operations in the New Westminster Mining Division for the year 1903.

The claims recorded during the year were distributed over a wide area. On Howe sound and vicinity there were 69; on Capilano, Lynn and Seymour creeks, 48; Chilliwhack and vicinity, 18; Harrison river and vicinity, 15; Pitt lake and river, 13; Lillooet river, 6; Jervis inlet, 3.

It is to be regretted that there have been no new developments in the district worthy of special report. As far as has yet been ascertained, the ore is all low-grade and cannot be profitably worked except on a large scale and with the most economical plant and equipment. This would necessarily involve the investment of a larger amount of capital than has heretofore been obtained. The quantity of ore existing is practically unlimited, and it was hoped and expected that before this time some of the properties would be in active operation as shipping mines.

The *Britannia Group*, on Howe sound, is the only property on which any considerable expenditure has been made during the year. The stock of this property (having a par value of $250,000) has been consolidated and is now entirely owned by the Britannia Copper Syndicate. During the year upwards of $20,000 has been spent in exploratory and other work. It has been determined to construct an aerial tramway from the mines to the shore of Howe sound, a distance of 3 miles, by which to convey the ore to the wharf for shipment or treatment. The route of this line has been cleared, and it is the intention of the syndicate to proceed with the erection of the necessary plant and equipment in the spring. The townsite, comprising about 150 acres, has also been partly cleared.

Exploratory work on the *South Valley Group*, near the *Britannia*, has demonstrated that this property is on the same lode as the latter. There are, therefore, three very extensive copper properties adjacent to each other in this region, namely, the *Britannia Group*, the *Goldsmith Group* and the *South Valley Group*, all showing large bodies of similar ore. As soon as it has been proved by actual operation that any of these properties can be profitably worked, the others will almost certainly be opened up and the manipulation of this vast body of ore will give employment to hundreds of men. There are many other similar properties in this region, as well as on Lynn creek, Pitt lake and elsewhere, the development of which is dependent upon actual proof that this class of ore can be worked at a profit.

OFFICE STATISTICS—NEW WESTMINSTER MINING DIVISION.

	1902.	1903.
Free miners' certificates issued	1,038	855
Quartz claims recorded	188	173
Certificates of work recorded	256	192
Certificates of improvements recorded	5	13
Conveyances recorded	53	32

Revenue.

	1902.	1903.
Free miners' certificates	$6,181 56	$5,384 85
Mining receipts general	2,581 50	2,912 05
Total	$8,763 06	$8,296 90

INSPECTION OF METALLIFEROUS MINES.

Report of James McGregor, Inspector.

I have the honour to submit my annual report for the year 1903, with respect to the condition of the metalliferous mines in my District.

Trout Lake and Lardeau. Considerable mining has been accomplished in these districts during the year, and also a great amount of prospecting and developing. Where timbering is required it is well placed. The law regulating the thawing of powder is strictly carried out. I find upon inspection of the bunk-houses, that they all appear to be in a sanitary condition.

Slocan. The principal work during the year in this district has been development, all of which has been carefully attended to, with regard to the safety of the workmen, by timbering where necessary and using the safest methods of thawing powder; also all travelling ways and means of escape are well laddered and guarded. I have not in any instance found the Act being violated.

Nelson. The shipping mines in this district have operated the entire year with the exception of the *Poorman*, which suspended work a few weeks ago. There has been a considerable amount of development and prospecting, all of which is being carried on in accordance with the Act.

Trail. The mines in this district have progressed very rapidly during the year, both in output and development. As they are the deeper mines, they require to be worked principally by what is known as the square set system of timbering. This system requires a large quantity of timber, carefully framed. The framing is done by machinery, insuring a perfect and uniform fit, and upon inspection I found the timbers properly placed. In operating these mines a large amount of machinery is necessary, which is kept in splendid condition. The ropes, cages, catches, and signals are all in compliance with the Act. The safety catches, I might say, are frequently tested. The thawing of the powder is done outside of the mines at a safe distance, and all blasting is done at night, with the exception, when necessary, of breaking a few boulders in the daytime to clear the way, in order to facilitate the work. All ladder and travelling ways are kept according to the Act, thus insuring safety.

Boundary. The mines in this district have greatly increased their capacity, thereby entailing a much greater amount of machinery and timbering than last year. The principal mines in this district are worked partly by open cuts or quarries and partly by shafts. The machinery, I find upon inspection, in all of these mines, together with the ropes, cages, catches and signals, in splendid condition. Many new properties in this district have been opened up during the year.

In the Vernon district there has been a slight increase over other years in development work.

In the Ainsworth district there is very little development work being done.

REPORT OF ARCHIBALD DICK, INSPECTOR.

I have the honour to submit herewith my annual report on the metalliferous mines of the East Kootenay District for the year 1903.

Very little has been done in this section during the year. I visited many of the mines but found that no work was in progress, with the exception of the *North Star*, near Kimberly, where a small force of men has been employed. On the property of the Sullivan Mining Co. a few men were also at work for two months, when operations were suspended. This company has done nothing further to its partially finished smelter at Marysville, but it is said that it will be completed next summer.

I was unable to leave Fernie long enough to visit the *Ptarmigan* and other mines in the Windermere Division.

Of the four accidents reported (*see* list), three were caused by drilling into missed holes and one by the fumes of gas from the powder after blasting. All of them could have been avoided, although I am aware that the men did not know they were working so close to charged holes. I would suggest that a hole that has missed fire should not be unrammed, nor should another hole be drilled except at a safe distance away.

REPORT OF THOS. MORGAN, INSPECTOR.

I have the honour to submit my report for the year 1903, as Inspector of Metalliferous Mines for Vancouver Island and Texada island.

Lenora. This mine is situated at Mount Sicker, and was last inspected by me on November 23rd, 1903. No accidents were reported for the past year. The mine is well ventilated by natural ventilation and compressed air, and everything is in a safe condition. The ore from this property is taken to the smelter at Crofton, a distance of 13 miles.

Tyee. This mine is also situated at Mount Sicker, and my last inspection was on November 23rd, 1903. No accidents occurred during the year. It is well ventilated by natural ventilation, assisted by a small fan. During the past year considerable improvements have been made. New ropes have been put on for the aerial tramway, the loaded track-rope being 1¾-inch and the light track-rope ⅞-inch. A saw-mill has been installed to supply the mine with the necessary timber. New bunk-houses have been built, and a reading room and many other improvements made for the comfort of the men employed. Everything in connection with the property is kept in first-class order.

Marble Bay. This mine, situated on Texada island, was last inspected by me on October 8th, 1903. Everything was in a safe condition and well ventilated by natural ventilation and compressed air. No accidents have happened during the past year.

Cornell. My last inspection of this mine, situated on Texada island, was made on the 8th of October, and my official report forwarded. The workings of the mine are safe and the ventilation, by both natural and compressed air, was very good. The management has neglected to put in a cage, as they promised to do some time back; I again notified them about it and received an answer stating that it would be done about the first of the year. A tramway has been built from the mine to the bunkers at deep water, a distance of about two miles.

Copper Queen. This mine is also situated on Texada island and was inspected by me on the 8th of October, 1903. It is ventilated by natural ventilation and compressed air. No accidents occurred during the year. The mine is in good condition, with the exception of not having a cage, but this is to be put in immediately.

Rose Group, or Newton Mine. I did not make any inspection of this mine, situated in Renfrew district, but a fatal accident was reported as occurring under the following circumstances. Two men, named Oswyn D. S. Scholefield and E. Jenkins, were blasting six holes. Just as Scholefield lit the last hole the first hole exploded, knocking them both down. Jenkins got outside the tunnel before the second hole exploded, but Scholefield was in the tunnel when the rest of the shots went off. Scholefield got outside the tunnel himself and was carried to a cabin, where he died one hour and thirty minutes later.

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1903.

January 1—William Chegwedder, miner, working in the North Star mine, Kimberley, was seriously injured, and lost the sight of both eyes, by drilling into a missed shot.

" 5—Fred. Tartan, blaster, Knob Hill mine, Phœnix, severely crushed by ore pile rolling down upon him.

" 10—Moses Jackson, miner, Venus mine, Nelson, killed by a fall of rock.

" 26—W. F. Wilton, miner, working in Ptarmigan mine, Wilmer, got slightly bruised on the legs by rocks, through drilling into a missed shot.

" 26—Edward Wills, miner, working in the Ptarmigan mine, Wilmer, was killed by drilling into a missed shot. Wills and Wilton were working together.

February 9—John Haven, miner, Le Roi mine, Rossland, bone of leg fractured by falling rock.

" 19—Archie Love, skip-tender, Le Roi mine, Rossland, killed in shaft.

" 19—August Feig and Gus Oleson, miners, Columbia-Kootenay mine, Rossland, killed by gas in shaft.

March 2—Samuel Ward, timberman, Centre Star mine, Rossland, killed in shaft by cage.

" 3—William Watson, miner, Knob Hill mine, Phœnix, killed by blast, through drilling into missed hole.

" 3—John Salmon, miner, Knob Hill mine, Phœnix, injured severely by drilling into missed hole; died in hospital on the 4th.

" 7—Ben Colnon, timber trammer, Le Roi mine, Rossland, slightly bruised by timber falling on him.

" 7—Patrick Crichly, shift boss, R. Savage, Otto Bloom, Allen Calder and Edward Gagnon, miners, asphyxiated by gas in Nettie L. mine, Ferguson.

May 9—C. A. Peterson, carman, Old Ironsides mine, Phœnix, finger smashed.

" 15—John Rivers, miner, Le Roi mine, Rossland, hand slightly cut by machine handle.

" 19—Bert Perry, miner, Payton tunnel, Rossland, slightly cut on head by falling rock.

" 30—Ralph Leslie, Superintendent, Le Roi mine, Rossland, slightly injured about the head by falling timber.

July 2—W. Nicholson, timberman, Le Roi Mine, Rossland, slightly bruised on head and shoulders by rock falling from floor above.

〃 7—A. Campbell, shoveller, Le Roi mine, Rossland, badly bruised on head and shoulders by falling down ore chute.

〃 15—J. W. Wilkenreid, miner, Snowshoe mine, Phœnix, finger crushed by rock rolling upon it.

〃 25—H. N. Peterson, miner, Le Roi mine, Rossland, slight cut on the neck by falling rock.

August 15—W. Caumbe, miner, Centre Star mine, Rossland, thigh broken by fall of rock.

〃 28—John Kraft, blacksmith's helper, Le Roi mine, Rossland, injured on face and eyes by cap or powder exploding in forge.

September 10—Robert Curtis, mucker, Ymir mine, Ymir, killed by fall of rock.

〃 22—Archie Conners, miner, Emma mine, Eholt, killed by falling down shaft.

October 11—Oswyn D. S. Scholefield, miner, Newton's mine, Vancouver Island, killed by premature explosion of shots while blasting.

〃 23—James Crabb and Thos. Malloy, muckers, Knob Hill mine, Phœnix, killed by cave of rock.

November 5—P. H. Beach, pipeman, Le Roi mine, Rossland, toe broken through his falling from floor above.

December 11—E. Anderson, shoveller, Le Roi mine, Rossland, small bone broken through his falling down ore chute.

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COAL MINING IN BRITISH COLUMBIA.

The coal fields of British Columbia actually working at the present time are those on Vancouver Island and the collieries of the Crow's Nest Pass Coal Co., situated on the western slope of the Rocky mountains. Coal is known to exist in many other parts of the Province and a good deal of prospecting has been done, but no serious development work has yet been undertaken, owing largely to the lack of transportation facilities. As has been already mentioned, there have been a good many inquiries as to the coal existing on Queen Charlotte Islands and referred to in the Report for 1902 (*see* pages 54 to 58), and it is said that there is probability of boring operations being started there this coming summer.

In the Yale district the known coal deposits near Nicola have been further investigated by surveys and boring during the past year. These further surveys and the prospecting work done have led to the discovery of extensions of the coal area not previously known. Extensive boring operations are planned for next year, but as yet no further available data has been obtained regarding these coal seams or the commercial value of the coal itself (*see* Minister of Mines' Report for 1901, pages 1,147, 1,156, 1,175, 1,183 and 1,184).

In the Bulkley valley and vicinity several new coal leases have been staked and further investigation has confirmed the previous reports of the existence of beds of excellent bituminous coal in this section. It is further reported that extensive beds of anthracite have been discovered and partially developed.

From the Peace river there are authentic reports of the existence of coal, just to the east of the Rocky Mountain range, but still in British Columbia, while discoveries are also reported in the vicinity of the Findlay river, Omineca. In Cariboo, too, as has been elsewhere noted, coal has been discovered on the Horsefly river and near Quesnel lake, and it is expected that the latter occurrence will be more fully investigated during the coming year.

In the eastern part of the Province, near the Crow's Nest coal area, further coal fields have been proven and coal lands have been located for many miles up the Elk river.

For the purpose of showing the quality of the coals of British Columbia, a series of analyses were made recently at the Government Laboratory of samples taken from coal seams actually being worked, and full tables of these analyses will be found in the Minister of Mines' Report for 1902 (pages 261 to 264).

Vancouver Island Collieries.

A decrease of 346,036 tons of coal and 4,399 tons of coke took place in the production of Vancouver Island Collieries in 1903. As already pointed out (*see* page 18), a large proportion of the output of the coast mines is used in California, and the market of that State has been so largely invaded by local fuel in the form of oil as to, at least temporarily, lessen the demand for coal. On the other hand, the local market has consumed more coal and the whole production of coke, a favourable indication as to increase of home industries. A detailed description of the Vancouver Island Collieries is found in the report of the Inspector which follows (page 219).

Crow's Nest Pass Collieries.

The gross output of coal from the Crow's Nest Pass Collieries is 195,927 tons in excess of the production of last year, an increase of 50 %, which has been made despite many adverse circumstances. The production of coke also shows an increase, amounting to 41,927 tons, or nearly 40 % more than in 1902. The report of the Inspector follows on page ....

The following table shows the production of coal and coke by British Columbia collieries and the distribution of the output, together with the number of men employed and the wages paid for each class of labour, etc. :—

COAL AND COKE PRODUCED, EXPORTED, ETC.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	527,114	16	....	....	141,504	17		
" export to U. S.	546,723	10	....	....	27,757	14		
" " to other countries	2,725	....	....	....	....	....		
Total sales	....	....	1,076,563	06			169,262	11
Used in making Coke	282,469	....						
Used under colliery boilers, etc.	137,915	13						
Total for colliery use	....	....	420,384	13				
			1,496,947	19				
Stocks on hand first of year	54,415	15						
" last of year	8,130	14						
Difference taken from Stock during year	....	....	46,285	01	....	....	3,719	
Output of collieries for year	....	....	1,450,662	18	....	....	165,543	11

By-products, fire clay, 1,833 tons.

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and clerical assistance	77	$4 30	49	$4 75	126	$4 52
Whites—Miners and Miners' helpers	1,920	3 72	....	....	1,920	3 72
Labourers	539	2 72	257	2 32	796	2 52
Mechanics and skilled labour	143	2 75	258	3 20	401	2 97
Boys	106	1 40	18	1 33	124	1 36
Japanese	64	2 12	34	1 25	98	1 68
Chinese	288	1 62	511	1 81	799	1 71
Indians	....	....	....	....	....	....
Totals	3,137	....	1,127	....	4,264	....

REPORT ON THE INSPECTION OF VANCOUVER ISLAND COAL MINES.

THOS. MORGAN, INSPECTOR OF VANCOUVER ISLAND COLLIERIES.

I have the honour, as Inspector of Coal Mines for Vancouver Island, to submit the following report for the year 1903.

The output of the Vancouver Island collieries for the year 1903 amounted to 860,775 tons, while the previous year's output was $1,247,665\frac{1}{10}$ tons. The constant demand for the excellent product of the Vancouver Island mines still continues, showing that it is yet holding first place on local and foreign markets. The collieries operated on Vancouver Island during the year 1903 were as follows:—

The Nanaimo Colliery, owned by the Western Fuel Company, consisting of No. 1 Shaft, Esplanade, in Nanaimo; Protection Island Shaft; and Harewood Mine.

Wellington Colliery, in Cranberry District, comprising Nos. 1, 2 and 3 Slope Mines, and the Tunnel Mine, worked by the Wellington Colliery Company, Limited.

Wellington Colliery, in Comox District, comprising No. 4 Slope, Nos. 5 and 6 Shafts, and No. 7 Slope, also operated by the Wollington Colliery Company, Limited.

AGGREGATE SUMMARY OF RETURNS FROM VANCOUVER ISLAND COLLIERIES FOR THE YEAR 1903.

	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	353,165	16		
" export to United States	400,713	—		
" " other Countries	2,725	—		
Total sales	....	....	756,603	16
Used in making Coke	32,918	—		
" under Colliery Boilers	117,538	3		
Total for Colliery use	....	....	150,456	3
			907,059	19
Stock on hand first of year	54,415	15		
" last of year	8,130	14		
Difference taken from stock during year	....	....	46,285	1
Output of Collieries for year 1903	....	....	860,774	18

NUMBER OF MEN EMPLOYED IN VANCOUVER ISLAND COLLIERIES.

CHARACTER OF LABOUR.	NUMBER EMPLOYED.		TOTAL NUMBER EMPLOYED.
	Underground.	Surface.	
Supervision and clerical	40	33	73
Whites—Miners	919	....	919
Miners' helpers	488	....	488
Labourers	276	66	342
Mechanics and skilled labour	23	178	201
Boys	92	13	105
Japanese	64	34	98
Chinese	288	479	767
Totals	2,190	803	2,993

The State of California has received the greatest part of the coal exported from Vancouver Island, but it has also been sent to Alaska and the Hawaiian islands, while the Pacific mail steamers have been regular consumers. The following statement shows the relative position of British Columbia coal exports in the market of California :—

	1902.	1903.
	Tons.	Tons.
British Columbia	591,732	289,890
Australia	197,328	276,186
English and Welsh	95,621	61,580
Scotch	3.600	3,495
Eastern (Cumberland and anthracite)	24,133	13,262
Seattle (Washington)	165,237	127,819
Tacoma (Washington)	209,358	256,826
Mount Diablo, Coos Bay and Tesla	111,209	84,277
Japan and Rocky Mountains (by rail)	47,380	102,219
Total	1,445,598	1,215,554

ACCIDENTS.

(For Statistical Tables of Accidents and Full List *see* pages 234, 235, 236 *et seq.*)

It is my painful duty to report the number of 71 accidents for the past year; 28 of these proved fatal, while 43 men received injuries of a serious and slight character. Referring to the fatal accidents, 17 were caused by explosions of gas, and, as already explained in my report, were due to negligence on the part of the sufferers, and if proper care had been taken would not have happened. Three fatalities were due to falls of coal, two of these being purely accidental, but the third was due to the miner not having his place timbered properly, after being told to do so by the fireman. Falls of rock accounted for four deaths, the blame of which can hardly be attached to anyone. Giant powder exploding resulted in two deaths, both happening while the men were preparing the charge and deemed accidental. Another fatality was caused by a locomotive running over a Chinaman, through his own fault. The remaining fatality was a pure accident, a link breaking and allowing part of the trip to run back, resulting in a Chinaman being run over. Of the serious accidents, 5 were caused by falls of coal, and 7 by falls of rock ; 5 were due to mine cars; 2 by men being struck with a rope; 4 by powder in the mine; 1 by being struck with a post, and 1 by a shot blowing through, making a total of 25. Slight injuries were suffered by 18 men; 12 of them were caused by explosions of gas ; 1 by fall of coal ; 2 were occasioned by falls of rock ; 2 resulted from mine cars ; while a rope striking a man accounted for the remaining accident.

The detailed statement accompanying this report contains full particulars of all these accidents; and in each and every case the most careful possible inquiry has been made, in order to ascertain the cause, and such measures adopted as appeared necessary to prevent a recurrence of these incidents. Monthly examinations of all the Vancouver Island mines have been regularly made by me, and special examinations whenever necessary.

COAL MINES OF THE WESTERN FUEL COMPANY.

(This Company has not authorised the publication of its Official Returns.)

The Western Fuel Company, successors to the New Vancouver Coal Mining and Land Co., Limited, has been working the following mines at the Nanaimo Colliery during the year, under the superintendence of Mr. Thomas Russell.

No. 1 Shaft, Esplanade, in Nanaimo, Joseph Randle, Manager.
Protection Island Shaft, Thos. Mills, Overman.
Harewood Mine, Thos. Budge, Manager.

The following additions and alterations have been made during the year:—

No. 1 SHAFT, NANAIMO.

The levels off the diagonal slope have been extended during the year, the workings being pillar and stall and extraction of pillars. On testing the air on December 15th I found 22,000 cubic feet passing per minute for the use of 30 men and 5 mules in this district. On my last inspection of this district I found a little gas in three places, all others being clear.

No. 7 Level, off the main slope, forms a district of its own, and the workings are pillar and stall and extraction of pillars; 8 men and 2 mules working in this district received 7,000 cubic feet of air per minute.

No. 3 North Level is another district. The level off the slope to the dip of No. 3 has been somewhat extended during the year; the workings are also pillar and stall and extraction of pillars. There were 12,700 cubic feet of air passing per minute for 22 men and 4 mules. These districts all receive their air from No. 1 Shaft.

In No. 1 North Level the workings are the Big Incline, Spear's Incline, and Lamb's Incline. The Big Incline workings are pillar and stall and extraction of pillars. There were 17,000 cubic feet of air passing per minute for the pillar workings on the right side of the Big Incline and the pillar workings of Spear's Incline, for the use of 30 men and 7 mules. The air test for the left side of the Big Incline showed 10,500 cubic feet per minute for 15 men and 3 mules. These places are damp. The air supplied to the workings in Lamb's Incline was 14,000 cubic feet per minute for 30 men and 8 mules. The intake for the workings of No. 1 North Level is by way of Protection Shaft.

PROTECTION ISLAND SHAFT.

Upper Seam.

Pillar and stall work and extraction of pillars has been carried on during the year. The main slope workings received 18,900 cubic feet of air per minute for the use of 35 men and 3 mules. The diagonal is not working, but received 5,000 cubic feet of air per minute to keep the places clear.

Lower Seam.

The workings of this seam are longwall, and 34 men and 2 mules received 8,400 cubic feet of air per minute. The air for Protection workings comes down Protection Shaft and the upcast is No. 2 Shaft (Esplanade), Nanaimo.

Air returned by way of No. 2 (upcast) Shaft, Esplanade	160,000	cubic feet per minute.
" " Newcastle "	45,000	" "
Total air for Protection and No. 1 Shafts	205,000	" "

The total air supplied to workmen was 115,500 cubic feet per minute, which leaves 89,500 cubic feet per minute for 80 mules, roads and old workings. The motive power for ventilation is two Guibal fans, one at No. 2 Shaft (Esplanade), Nanaimo, making 42 revolutions per minute, with 1¾-inch water gauge, and one at Newcastle, making 96 revolutions per minute, with 1½-inch water gauge.

HAREWOOD MINE.

This mine was idle until July, having been shut down for ten months. The work is pillar and stall and extraction of pillars. On my last inspection on December 24th there were 16,000 cubic feet of air passing for 22 men and 2 mules. The motive power for ventilation is a fan.

A slope is being driven from the Northfield point in a south-easterly direction under Newcastle channel, to reach the coal under Newcastle island. The slope is down 250 yards.

The company has made considerable improvements during the past year. A new washer has been put in, with a capacity of 400 tons per day, and two new tube boilers, of 253 horse-power each, have replaced some of the old boilers, while two return tubular boilers (133 horse-power), each 84 inches in diameter by 16 feet long with 108 4-inch tubes, and 1 Rand (class "B-3") air compressor, cross-compound steam, non-condensing, cross-compound air, capacity 2,513 cubic feet of free air per minute at normal speed, have been installed.

COAL MINES OF THE WELLINGTON COLLIERY COMPANY, LIMITED.

(This Company has not authorised the publication of its official returns.)

The Wellington Colliery Company, Limited, has been operating the following mines during the year 1903, under the general management of F. D. Little, M. E.:—

The Wellington Colliery, in Comox District; John Matthews, Manager.

The Wellington Colliery, in Cranberry District; Andrew Bryden, Manager.

NO. 4 SLOPE (WELLINGTON), COMOX.

Richard Short, Overman.

On the west side of the old slope, which is a district of its own, the workings have been off Nos. 3, 4, 5, 6, 9 and 11 levels by pillar and stall; the present workings are Nos. 9 and 11. The air for this district was 20,000 cubic feet per minute for 60 men and 8 mules. On the east side of the slope 9,000 cubic feet of air were passing for 12 men and 1 mule; this is another district.

In No. 2 Slope, extraction of pillars is being carried on, and the opening up of the levels that caved after the mine was flooded; 12,560 cubic feet of air per minute were supplied to this district for 19 men and 2 mules at a test made in December.

In No. 3 Slope the workings have been off Nos. 3½, 4, 6, 7 and 8 levels, by pillar and stall. Nos. 3½ and 4 level workings received 14,400 cubic feet of air per minute for 11 men and 1 mule, while Nos. 7 and 8 levels received 11,200 cubic feet per minute for 24 men and 2 mules

The total air in the return at the fan shaft was 100,800 cubic feet per minute, while the total air supplied to the workings was 67,160 cubic feet per minute, leaving a leakage of 33,640 cubic feet per minute for roads and old workings.

Considerable trouble has been experienced in this mine during the year with gob fire, caused by the flooding of the mine and the gob heating after the water was taken out.

NO. 5 SHAFT (WELLINGTON), COMOX.

James Strang, Overman.

The workings in the heading are all longwall, and received 12,500 cubic feet of air per minute for Nos. 2, 3 and 4 levels, where 40 men and 5 mules are working, while No. 5 level workings received 10,000 cubic feet of air per minute for 22 men and 2 mules, this being another district. The workings on the west side are by pillar and stall and extraction of pillars, and received 26,250 cubic feet of air per minute for 23 men and 3 mules. The total air in the return at the upcast shaft was 59,000 cubic feet per minute, while the air supplied to the working places was 48,750 cubic feet per minute, which leaves 10,250 cubic feet per minute for mules, roads and old workings. The motive power for the ventilation is a Guibal fan running 103 revolutions per minute, with 1½-inch water-gauge.

NO. 6 SHAFT (WELLINGTON), COMOX.

John Kesley, Overman.

The present workings of this mine are Nos. 1 and 4 inclines, and the work is pillar and stall. Nos. 1 and 4 inclines form one district, and received 14,400 cubic feet of air per minute for the use of 46 men and 3 mules.

Nos. 2 and 3 inclines have not worked since the explosion in July, but received 24,750 cubic feet of air per minute to keep old workings clear.

The total air at the intake was 48,200 cubic feet per minute, while total air supplied to working places was 39,150, which leaves 9,050 cubic feet per minute for roads, old workings and mule stables.

NO. 7. SLOPE (WELLINGTON), COMOX.

This mine is situated about four miles in a westerly direction from No. 5 shaft. The work of driving two slopes (main and counter) was started a little over a year ago, but it was greatly retarded by the difficult nature of the ground to be driven through, *i. e.*, clay, sand and gravel, which, owing to its open nature, has given off a considerable quantity of water. The slopes were driven on a 1 in 8 pitch, reaching the coal at a distance of 700 feet. The seam proved to be about four feet thick, pitching about 1 in 10 in a north-easterly direction, and the coal, of good quality, being anthracite. This mine will open up a very extensive coal field, and, judging from the contour of the surface, should be comparatively free from faults and dislocations, which are unfortunately too common in this district. An air shaft is also being sunk near the main slope. Considerable work has been done in clearing a site for pit-head, chutes, side-tracks, etc.; it will, however, take a few months longer to complete this. The first shipment of coal was made from this mine on the first of the year.

NO. 1 SLOPE, EXTENSION.

This mine was finished in the month of August.

NO. 2 SLOPE, EXTENSION.

Alexander Shaw, Overman.

Nos. 2, 3 and 4 east levels have been working during the year, the work being extension of the levels, pillar and stall, and extraction of pillars. The slope to the dip has been somewhat extended and is still in good coal; the workings in the slope received 15,000 cubic feet per minute for 17 men and 2 mules. No. 4 east level workings received 18,000 cubic feet per minute for 22 men and 2 mules. No. 3 level workings were supplied with 7,000 cubic feet of air per minute for 13 men and 2 mules; while 20,000 cubic feet per minute were supplied to No. 2 level workings for 30 men and 3 mules. Total air in the return was 105,000 cubic feet per minute. Total air supplied to working places was 60,000 cubic feet per minute, showing a leakage of 45,000 cubic feet per minute for roads and old workings. A Guibal fan, running 100 revolutions per minute, with 1½ inch water gauge, is the motive power for ventilation.

NO. 3 SLOPE, EXTENSION.

James Sharp, Overman.

The slope is down 380 yards in good coal, to the dip of No. 4, and forms a district of its own; it received 13,125 cubic feet of air per minute for 14 men and 2 mules.

In No. 4 west level, pillar and stall work and pillar work is being carried on and forms another district, which received 16,485 cubic feet of air per minute for 16 men and 3 mules.

No. 3 level is being extended, and pillar and stall work and pillar work being carried on; it received 46,000 cubic feet of air per minute for 35 men and 4 mules.

Nos. 1 and 2 level district received 19,200 cubic feet of air per minute for 33 men and 3 mules.

Total air supplied to the mine was 108,250 cubic feet, the working places receiving 94,810 cubic feet per minute, leaving a leakage of 13,440 cubic feet per minute for old workings and roads. A Guibal fan, running 100 revolutions per minute, with 1½-inch water gauge, is the motive power for ventilation.

TUNNEL MINE, EXTENSION.

William Jones, Overman.

In No. 1 level east the slope to the dip has been extended to 250 yards in good coal. In Nos. 1, 2, 3 and 4 levels east, pillar and stall work and extraction of pillars has been carried on, and received 10,500 cubic feet of air per minute for 26 men and 3 mules. In Nos. 2 and 4 levels, on the west side, the work has been extracting pillars; 23,000 cubic feet of air per minute were received for 3 men and 1 mule.

In Nos. 6 and 8 levels, pillar and stall work and extracting pillars has been carried on. This district received 21,000 cubic feet per minute for 40 men and 6 mules. The total air supplied to the mine was 77,000 cubic feet per minute, while the workings received 54,500 cubic feet per minute, which shows a leakage of 22,500 for roads and old workings. A Murphy fan, making 180 revolutions per minute, is the motive power for ventilation. All the coal from Nos. 2 and 3 Slopes and the Tunnel workings is brought out from the tunnel by a 14-ton motor.

REPORT ON THE INSPECTION OF CROW'S NEST COLLIERIES.

By Archibald Dick, Inspector.

I have the honour to submit my annual report for 1903, on the inspection of Crow's Nest Collieries, being a summary of the reports which have been forwarded monthly, together with the official returns from the Crow's Nest Pass Coal Company.

The Crow's Nest Pass Coal Co., Ltd.; head office at Toronto, Ont.

Officers.	Address.
Hon. Geo. A. Cox, President,	Toronto, Ont.
Robert Jaffray,	〃
Lt.-Col. H. M. Pellatt, Vice-President,	〃
G. G. S. Lindsey, Secretary and Managing Director,	〃
E. R. Wood, Treasurer,	〃
Thos. R. Stockett, Jr., General Manager,	Fernie, B. C.
R. G. Drinnan, Inspector of Mines,	〃

Capital of Company, $3,500,000.

The above Company is now operating the following extensive collieries on the western slope of the Rocky mountains in the East Kootenay District, viz.:—

Coal Creek Collieries, situated on Coal creek, about 5 miles from the town of Fernie, on the C. P. Railway, with a branch railway to the mines.

Michel Collieries, situated on both sides of Michel creek, on the line of the C. P. Railway, being 23 miles in a north-east direction from Fernie.

Morrissey Collieries, situated on Morrissey creek and connected with the C. P. Railway and the Great Northern Railway. Morrissey Colliery is about 14 miles from Fernie, by rail, in a south-easterly direction.

In addition to operating the above producing mines, the Company is doing a lot of exploratory development work, opening up new mines in the extensive coal fields owned by it, as well as improving its system of working and handling of the coal.

The output of both coal and coke for 1903 shows a large increase over the previous year, as the following returns will show:—The total coal produced from the Crow's Nest Pass Collieries during 1903 was 589,888 tons, compared with 393,961 tons in 1902, being an increase of 195,927 tons. Of this 249,551 tons were converted into coke, 173,949 tons were sold in the Dominion of Canada, including 20,376.12 tons used under the company's boilers, and 145,010 tons were exported to the United States. The 249,551 tons converted into coke produced 149,764 tons, compared with 107,837 tons in 1902, being an increase of 41,926.07 tons in 1903. Of this coke 27,757.14 tons were sold in the United States, and 122,006.01 tons were sold in the Dominion of Canada, being an increase of 40,933 tons more than was consumed the previous year.

COAL CREEK COLLIERY.

Andrew Colville, Manager.

This colliery, better known as "The Fernie Mines," is about five miles, by a branch line, from the Canadian Pacific Crow's Nest Pass Railway. On this railway the coal company, by an understanding with the C. P. R. Company, runs four trains per day to and from the mines, without charge to any person who wishes to go. This is termed the workmen's train, as it runs to suit the men going on and coming off their work, many of whom have their homes at Fernie, the chief commercial town in this district. The Crow's Nest Company, with its usual forethought and liberality, provides a coach on each train for the accommodation of ladies.

At this colliery there have been great improvements made during the year, and some of the mines which were only started at the beginning of 1903 are now producing coal and have good prospects ahead.

No. 1 Mine.

The workings of this mine are into the mountain on the right bank of Coal Creek. Here the coal is 30 feet thick and of a very good quality. There is no powder used in this mine. An attempt is made to timber or hold up about 20 feet of the coal, but it is so loose and fine that it will run out at a very small hole. Much timber is required here, and it takes more day-men to keep the works in order than there are mining coal. For ventilation there were 119,500 cubic feet of air going through the mine the last time I was there.

No. 2 Mine.

This is the mine where the terrible explosion took place in May, 1902. There has been a large party of men working in this district for over a year, getting it in order for a tailrope haulage system, and it is now about ready to be put in operation. You will have seen in my monthly reports that everything here is in good order, with ventilation very good. There is no powder used in this mine, except in No. 1 district, near the outcrop of coal.

No. 3 Mine.

This mine is in very good order, well timbered and ventilated. It is the same seam of coal as that worked in No. 2 mine. No gas is seen here, but all the men use safety lamps.

No. 4 Mine.

This is one of the new mines mentioned in previous reports. It is in very good order, well ventilated, having a fan worked by electricity, and the coal is 22 feet thick.

No. 5 Mine.

This is also a new mine in which the coal is 10 feet thick. I may here say that the roof in both Nos. 4 and 5 mines is good, with attention. This mine is in very good order, and here also there is a ventilating fan worked by electricity, which gives satisfactory results. The coal from Nos. 4 and 5 mines is hauled along the side-hill road to the Nos. 1 and 2 tipples.

No. 9 Mine.

This is a new mine and has good prospects. The level is in a long distance, and the works are now being put in order previous to starting operations. The coal here is very hard.

The above six mines are all at present in operation at Coal Creek Colliery. There are no lights except in locked safety lamps (the Wolf).

The following are the official returns of the Coal Creek Colliery for the year ending 31st December, 1903:—

Sales and Output for Year.	Coal.				Coke.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	73,127	08	....	....	60,021	19		
" export to U. S	1,810	14	....	....	24,299	01		
" " to other countries.....	....	....	....	....	....	....		
Total Sales.............	....	....	74,938	02	....	....	84,321	—
Used in making Coke	131,802	—						
" under Colliery Boilers, &c	9,050	18						
Total for Colliery Use....	....	....	140,852	18				
Stocks on hand first of year...........	....	....	....	....				
" last of year	....	....	....	....				
Difference taken from Stock during year	....	....	....	....	....	....		
Output of Colliery for Year.	....	....	215,791	—	....	....	84,321	—

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

Character of Labour.	Underground.		Above Ground.		Totals.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance.	13	$3.00 to $5.00	7	$3.00 to $6.00	20	....
Whites—Miners Miners' Helpers	168	3.00 to $6.00	....	....	168	....
Labourers	100	2.50 to 3.00	49	2.00 to 2.50	149	....
Mechanics & Skilled Labour	63	2.50 to 3.00	29	2.50 to 4.00	92	....
Boys	9	1.00 to 1.50	3	1.00 to 1.50	12	....
Japanese	....	....	....	....	....	....
Chinese	....	....	....	....	....	....
Indians	....	....	....	....	....	....
Totals..................	353	....	88	....	441	....

THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

The Minister of Mines is hereby authorised to publish these Returns.

THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

MICHEL COLLIERY.

Arthur R. Wilson, Manager.

No. 3 Mine (Upper.)

I have been all through this mine thirteen times during the past year and duly reported on same. This mine is kept in particularly good order, although there are not many men working in it. I have not yet found gas, but at the same time all the men work by the light of the Wolf safety lamp.

No. 3 Mine (Lower.)

This is the mine at the back end of No. 5 Tunnel, where the accident occurred on the 8th January. It was always in order, and was not far in from the tunnel. I never found any gas there after the upraise was put through. Most of the workings are wet, and when I was there in December there were great columns of ice not far from the face. It is well ventilated and the Wolf safety lamp is used.

No. 4 Mine.

This is also a mine in connection with No. 5 Tunnel, and is kept in very good order, well timbered, and the brattice well attended to. Every place seemed to be kept in good condition. There is a large volume of air passing per minute in this mine and all the men use the Wolf locked safety lamp.

No. 5 Mine.

This is also in connection with and is the same tunnel as that mentioned at Lower Nos. 3 and 4 mines, but it is a different seam of coal. There is a ventilating fan with a separate intake and air return. This mine is in good order and I do not know that I have ever seen gas here. All the men use locked safety lamps.

No. 6 Mine.

This is a new mine and they have just got into the coal and taken the first cars over the road.

No. 7 Mine.

This is also a new mine, but although they have got to the coal it will be some time before they will be able to take the cars to the mine. Both of the above (6 and 7 mines) are well timbered with massive timbers.

No. 8 Mine.

This is the most extensive mine of this colliery. The seam of coal is 12 feet thick and in some places 30 feet. The mine is in very good order, and there has been very little gas seen here. All the men, except those in the level, work with open lights. Ventilation is good.

No. 9 Mine.

This is also a safe mine, although not very extensive. The coal is 10 feet thick. Everything in connection with this mine is in good order, and the ventilation is very good. These Nos. 8 and 9 mines are in different seams of coal and are ventilated separately from the outside, but return to the same fan. This fan is a large, new one, only started a few days ago, which passes 70,000 cubic feet of air, while working at reduced speed.

Nos. 10 and 11 Mines are waiting till spring before they resume operations again.

The following are the official returns of the Michel Colliery for the year ending December 31st, 1903:—

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	98,582	03	....		61,984	08		
" export to U. S	18,379	18	....		2,833	12		
" " to other Countries	....	....	....		....	....		
Total Sales	....	....	116,962	01	....	....	64,818	—
Used in making Coke	112,283	—						
" under Colliery Boilers, &c	6,101	—						
Total for Colliery Use	....	....	118,384	19				
Output of Colliery for Year	....	....	235,347	—	....	....	64,818	—

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	15	$3 to $5.00	5	$3 to $6	20	
Whites—Miners. Miners' Helpers	202	$2.50 to $6	....	....	202	
Labourers	104	$2.50 to $3	95	$2 to $2.50	199	
Mechanics and Skilled Labour	37	$2.50 to $3	29	$2.50 to $4	66	
Boys	5	$1 to $1.50	....	....	5	
Japanese	....	....	....	....	....	
Chinese	....	....	32	$1 25	32	
Indians	....	....	....	....	....	
Totals	363	....	161	....	524	

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General Superintendent.

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THE CROW'S NEST PASS COAL CO., LTD.,

THOS. R. STOCKETT, JR.,

General Superintendent.

MORRISSEY COLLIERY.

Charles Simister, Manager.

O Tunnel.

This tunnel is the highest in the coal measures worked here. The coal is three feet thick, hard and of good quality. This mine is in very good order but somewhat wet, which is more noticeable owing to the thinness of the coal. Everything here, ventilation, etc., is in good order. I have not yet seen any gas in this mine, but all the men work by the light of the safety lamp (Wolf).

No. 1 Mine.

Notwithstanding the repeated outbursts of gas, I am bound to say that this mine could scarcely be put in better order. I have examined it time after time, and whoever else did so would admit that it is the safest mine in the colliery. Everything is in good order, and every care seems to be taken to prevent accident. The seam of coal, as near as I can make it, is 40 feet thick, and they are working, in the first place, about 10 feet of the top. Ventilation is very good here; there are three connections with the outside and they are making another near the face where most of the men work, so that in case of an accident or outburst of gas, the men in the upper workings will be almost outside.

No. 2 Mine.

This mine has been in operation nearly all the past year. There are not any rooms yet, only the two levels. It is in very good order, well timbered and ventilation good.

No. 2 Water Level Mine.

This mine was in very good order and well timbered. It will eventually be part of No. 2 Mine.

No. 3 Mine.

I have reported frequently upon this mine during the year. The coal here is about 4 feet thick. The mine is in good order and ventilation is very good. Here, as in No. 2 mine, all the men work by the light of locked safety lamps (the Wolf). It is a rare thing to find gas in this mine.

No. 4 Mine.

I have been frequently through all this mine, which is in very good order. There are four ways out, all of them available. There is a large, open roadway up near the face, by which all the men working in the rise workings are expected to go in and out. Gas is rarely found here and the ventilation is very good.

No. 5 Mine.

This is abandoned for the present, but may be opened soon.

The above 20 mines of the Crow's Nest Pass Collieries will be in full operation, I expect, during the year 1904, and I am confident that the output of coal will go into seven figures.

The outbursts of gas in these collieries are of so remarkable a nature that a brief description of them may be of general interest:—

On August 6th, 1903, while the men were at work in the main entry of No. 1 Mine, Morrissey, the coal in the face began to make a noise as if the mine was going to close up, and it was thought desirable to let the men know. Before they were all out, however, the face of coal burst, and the mine was full of gas in a short time. It came out to the level, where there was a velocity of air going in at the rate 550 feet per minute; but this was no resistance to the force of the gas, as it blew coal and dust out of the mouth of the tunnel for fully 100 feet. All the men were got out, but some of them had a very close call. With the ventilating fan running to its fullest speed, it was three days before the gas was cleared out so that the officials could get in. Upon entering, the sight was remarkable. The level was filled with coal for 200 feet out, and in the 100 feet nearest the face there was not a timber left standing and, to all appearances, it looked as if the mine had not been worked, save for the timber sticking out of the coal. Where the timbers were knocked out the level was 14 feet wide and 9 feet high, but was filled so quickly that the roof had not time to fall. All this coal was sent out and weighed, and amounted to 1,500 tons, leaving a hole in the place large enough for a locomotive to go in, the back of this hole being fully 100 feet further in than where the face was previous to the outburst. On the 14th October there was another outburst of gas, and though not so large as the other one, had a more serious result, as four men lost their lives by being suffocated. In this latter outburst there were over 800 tons of coal dislodged. The management is trying the best means they can suggest to avoid these outbursts and keep the men safe. After one of these blowers has come away, it is quite a time before gas can again be found in the mine.

The company has made a large addition to its machinery and plant at its several collieries during the past year, in ventilating fans, steam-engines, air compressors and electric plants. A large number of ovens have also been added to convert coal into coke, for which last there is a great demand, both in the Dominion of Canada and United States, as well as for all the coal that can be produced.

The following are the official returns of the Morrissey Colliery for the year ending 31st December, 1903:—

Sales and Output for Year.	Coal.				Coke.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	2,239	09						
" export to U. S....	125,819	18	....	....	625	01		
" " to other Countries.....	....	....						
Total Sales.............	....	....	128,059	07	....	....	625	01
Used in making Coke at Comox.	5,466	—						
" under Colliery Boilers, &c	5,224	13						
Total for Colliery Use....	....	....	10,690	13				
Output of Colliery for year.	....	....	138,750		....	....	625	01

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance...	9	$3 to $5.50	4	$3.00 to $6.00	13	
Whites—Miners......... Miners' Helpers	143	2.50 to 6.00	....	....	143	
Labourers	59	2.50 to 3.00	47	2.00 to 2.50	106	
Mechanics and Skilled Labour	20	2.50 to 3.00	22	2.50 to 4.00	42	
Boys	....	....	2	$1.50	2	
Japanese	....	....	....	....	....	
Chinese..........................	....	....	....		....	
Indians	....	....	....	....	....	
Totals..................	231		75	....	306	

THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

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THE CROW'S NEST PASS COAL CO., LTD.,
THOS. R. STOCKETT, JR.,
General Superintendent.

COKE OVENS.

There are 424 coke ovens at Fernie and 410 at Michel, where there are 54 more nearing completion. At Morrissey there are 148 ovens, with 92 more nearly completed; so that, from all appearances, the year we have now entered on will exceed any other in coal and coke production. The Crow's Nest Pass Coal Company has now 982 ovens, with 146 more nearing completion, which will bring the total up to 1,128 ovens.

ACCIDENTS IN AND ABOUT THE CROW'S NEST PASS COLLIERIES.

(*See* Tables of Accidents, p. 234 *et seq.*)

I may here record that two bodies of those killed in the explosion of the 22nd of May, 1902, were found on the 17th of April, 1903, namely: Angelo Federio, Gaetano Federio.

I deeply regret to have to report the following long list of accidents which have been reported to me during the past year, being a total of 30, which are divided into fatal, serious and slight.

There were 15 fatal accidents, as follows: One by a prop being knocked out and striking a man on the head; 2 by cars running over men while at work; 4 by falls of rock where the men were working; 1 by a fall of coal; 1 by the electric motor; 1 by the locomotive on the railway; 4 by men being suffocated in an outburst of gas, and one in which a man was found dead under his car, how he came there being a mystery.

Of the serious and slight accidents, 3 were with mine cars; 2 with ropes on incline; were slight burns by explosions of gas, all of which occurred in mines where naked lights used; 1 was by a horse running away; 3 by falls of rock where the men were working; 1 by the premature explosion of a shot, and 1 by a falling prop. It will be observed that most of the accidents were single occurrences.

It will almost be needless for me to say any more in connection with the casualties about coal mines. All the men have to undergo an examination to see if they are qualified and understand the rules before they can get a certificate to work as a coal miner in British Columbia. The miners know the rules well and are required to comply with the same, as most of them do; but in all large collieries where there are hundreds of men employed there are some careless men who will take great risks, and are a danger to themselves as well as to their more careful fellow-workmen, as the following illustrates:—

PROSECUTIONS UNDER THE "COAL MINES REGULATION ACT."

July 27—And Lasco; matches in Coal Creek mine; one month's imprisonment with hard labour.
" 27—Thos. Nelson; matches in Coal Creek mine; fined $5 and costs.
" 27—Pat Grayhan; matches and candle in Morrissey mine; one month's imprisonment.
" 27—John Olton; matches in Morrissey mine (did not appear).
" 30—Elijah Dudley; matches in Michel mine; fined $5 and costs.
" 30—Pete Mantabetta; matches in Michel mine; fined $5 and costs.
" 30—Thos. Johann; match in Michel mine (did not appear).
" 30—Louis Aquino; match in Michel mine; fined $5 and costs.
" 30—James Green; matches in Michel mine; fined $10 and costs.
" 30—Frank Durkin; match in Michel mine; fined $5 and costs.
" 30—Mike Williams; match in Michel mine; fined $5 and costs.
Nov. 12—Dennis Murray; pipe and match in Coal Creek mine; suspended sentence.
" 12—Mike Kipta; matches in Coal Creek mine; one month's imprisonment with hard labour.
" 12—Andrew Borsak; matches in Coal Creek mine; one month's imprisonment with hard labour.
" 12—Mike Conway; matches in Michel mine; one month's imprisonment with hard labour.
" 12—John Westley Wright; matches in Michel mine; one month's imprisonment with hard labour.
" 12—James Lennox; match in Morrissey mine; suspended sentence.
" 12—Andrew Smith; matches in Morrissey mine; one month's imprisonment with hard labour.
" 12—V. Verko; matches in Morrissey mine; one month's imprisonment with hard labour.
" 12—Frank Pilz; matches in Morrissey mine; one month's imprisonment with hard labour.
" 12—Frank Metha; matches in Morrissey mine; fined $10 and costs or two weeks' hard labour.
" 12—Frank Kurth; matches in Morrissey mine; one month's imprisonment with hard labour.
" 12—Jeo Kovack; matches in Morrissey mine; one month's imprisonment with hard labour.

There were quite a few other cases, but the parties concerned thought that it was best to get out of the way. The Magistrate told those in Court that the next men that came before him for having matches in their possession in any mine where only safety lamps are used would get the full penalty. I think if all precautions are taken by both mine officials and those working in the mines, accidents will be much fewer, and I cannot see why we should not be almost without any to report.

ACCIDENTS IN BRITISH COLUMBIA COLLIERIES DURING 1903.

CAUSES OF ACCIDENTS AND NATURE OF INJURY.	NAME OF COLLIERY.												TOTAL FOR 1903.			
	Nanaimo.			Union.			Extension.			Crow's Nest.						
	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Total.
Gas—Explosion or suffocation by																37
Fatal				17						*4			21			
Slight						11			1			4			16	
Falls of Coal																11
Fatal				1			2			1			4			
Serious		2			2			1						5		
Slight						1						1			2	
Falls of Rock																20
Fatal	1			2			1			4			8			
Serious		2			5						1			8		
Slight						2						2			4	
Mine Cars																14
Fatal				1						4			5			
Serious		1			2			2			2			7		
Slight									2						2	
Powder in Mine																6
Fatal	1												1			
Serious		4						1						5		
Shot																2
Serious								1			1			2		
Locomotive																2
Fatal							1			1			2			
Post or Timber																3
Fatal										1			1			
Serious					1						1			2		
Rope																5
Serious					1			1			2			4		
Slight									1						1	
Miscellaneous																1
Slight												1			1	
Total	2	9		21	11	14	4	6	4	15	7	8	42	33	26	101

* Suffocation.

SUMMARY—TABLE SHEWING ACCIDENTS OCCURRING IN B. C. COLLIERIES IN TEN YEARS—1894 TO 1903.

For the year	1894.				1895.				1896.				1897.				1898.				1899.				1900.				1901.				1902.				1903.				Total for 10 years.			
Output of coal—tons.	1,012,953				939,654				896,222				882,854				1,135,865				1,306,324				1,590,179				1,691,557				1,641,626				1,481,913				12,579,147			
No. persons employ'd	2,929				2,924				2,753				2,433				2,988				3,780				4,178				3,974				4,011				4,264				34,234			
Nature of Injury. / Cause of Accident.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.
Explosion (cause unknown).	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	64	..	..	64	125	..	..	125	..	..	..	..	189	..	..	189
Gas explosions	..	..	9	9	..	5	7	12	1	3	8	12	..	2	2	4	2	14	3	19	3	9	18	30	..	2	22	24	2	2	12	16	1	..	8	9	21	..	16	37	30	37	105	172
Falls of coal	2	7	..	9	1	4	..	5	3	4	1	8	1	3	2	6	3	4	..	7	1	4	3	8	2	14	3	19	6	9	2	17	1	4	1	6	4	5	2	11	24	58	14	96
〃 rock	..	8	..	8	5	13	..	18	2	8	..	10	2	7	2	11	1	5	3	9	3	5	4	12	6	15	3	24	6	8	4	18	7	6	2	15	8	8	4	20	40	83	22	145
Mine cars	..	4	1	5	2	9	..	11	1	8	..	9	3	4	..	7	1	9	3	13	3	9	4	16	4	7	3	14	3	5	5	13	3	6	5	14	5	7	2	14	25	68	23	116
〃 mules	..	..	..	..	..	..	..	..	..	2	..	2	..	1	..	1	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5	..	5
〃 timber	1	..	..	1	..	..	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	1	1	2	..	2	..	2	2	..	..	2	1	2	..	3	4	7	1	12
Hoisting, ropes, &c	..	2	..	2	..	3	..	3	..	1	..	1	..	2	..	2	..	..	..	..	..	..	..	..	1	..	..	1	..	2	..	2	..	2	..	2	..	4	1	5	1	16	1	18
Powder, &c., explo'n	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	3	1	4	..	2	1	3	1	3	3	7	..	4	6	10	..	..	1	1	1	5	..	6	2	18	12	32
Shot	1	1	1	3	2	3	..	5	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	3	..	..	..	..	..	..	..	..	..	2	..	2	3	8	4	15
On surface — miscellaneous.	..	..	..	..	..	2	..	2	2	..	..	2	..	..	..	..	..	2	..	2	1	..	..	1	3	1	..	4	2	2	2	6	..	3	1	4	2	..	1	3	10	10	4	24
Fire in Mine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	19	..	..	19	..	..	..	..	..	..	..	..	19	..	..	19
	4	22	11	37	10	39	7	56	9	29	9	47	6	21	6	33	7	39	10	56	11	29	30	70	17	43	38	98	102	34	31	167	139	21	18	178	42	33	26	101	347	310	186	843

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1903.

V. I. COLLIERIES, REPORTED BY THOS. MORGAN, INSPECTOR.

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
1	Nanaimo	Jan. 15th	R. Marsden...	Rope-rider ...	Leg broken in Protection Mine while jumping on the loaded car.
2	〃	〃 21st	Hugh Morrow.	Miner	Leg broken while mining in his stall in Protection Shaft, through fall of a piece of coal.
3	Extension....	〃 22nd	Matt. Lonma..	〃	Leg broken in No. 2 Mine through end of rope springing.
4	Union	〃 22nd	Nam Chow....	Labourer	Leg broken in No. 7 Mine through fall of a piece of clay.
5	Extension.....	〃 23rd	W. James	Miner	Slightly injured in No. 2 Mine by fall of a pulley.
6	〃	Feb. 7th	W. J. McAlpine	〃	Instantly killed while in the act of thawing giant powder with his naked light in his place. An inquest was held and the following verdict returned: "We, the undersigned, empanelled to give our verdict on the cause of the death of the late W. J. McAlpine, hereby state that he came to his death by the premature discharge of giant powder, being purely accidental."
7	〃	〃 14th	Ken. McInnis .	Roadsman	Fatally injured in No. 1 Slope through fall of coal and rock.
8	Union	March 4th	R. Hannah....	Miner	Slightly bruised by a fall of rock while working in his place in No. 5 Shaft.
9	Extension.....	〃 5th	Thos. Dodd ...	〃	Slightly injured in No. 2 Slope by being struck by a box of coal from which he had accidentally knocked the sprag.
10	Union	〃 7th	Ah Sing	〃	Killed by afterdamp in No. 6 Shaft, after an explosion of gas in No. 11 Stall.
11	〃	〃 7th	J. Johnny	〃	Slightly burned in the above accident.
12	〃	〃 7th	Ton Kid	〃	
13	〃	〃 7th	Jung	〃	
14	〃	〃 7th	On	〃	
15	〃	〃 7th	Fong	〃	
16	〃	〃 7th	Han	〃	
17	〃	〃 7th	Jack	〃	
18	〃	〃 9th	R. Hodson....	〃	Leg cut and bruised in No. 5 Shaft by fall of rock.
19	Nanaimo	April 3rd	James Jones ..	〃	Had his foot broken by a fall of rock in his stall in No. 1 Shaft.
20	〃	〃 3rd	O. Jacobson...	〃	Injured in the face by explosion of powder in the longwall, Protection Mine.
21	〃	〃 8th	Wm. Piper ...	〃	Killed in No. 1 Shaft in his stall by fall of rock.
22	Union	〃 9th	Sim Fin	Labourer	Killed in No. 7 Mine. A piece of clay fell from the face and knocked his head against a post, breaking his neck.

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1903.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
23	Union	April 10th	T. R. Anderson	Miner	Slightly bruised by a fall of coal while at work in his stall in No. 6 Shaft.
24	Nanaimo	May 12th	John Lawson..	〃	Killed by an explosion of Giant powder which he was preparing for a shot. It is not known how the accident occurred.
25	〃	〃 12th	A. Gartley....	Pusher......	Severely burned on hands and faces by same explosion.
26	〃	〃 12th	Geo. Churchill.	〃	
27	〃	〃 12th	H. Hasenfratz.	Miner.......	
28	Union	〃 23rd	Gee	Labourer	Severely injured about the head by a runaway car knocking out post in No. 7 Slope.
29	〃	〃 29th	Yuen Chung ..	Miner	Killed in his stall in No. 5 Shaft. A piece of rock rolled over, pinning him against a post and causing internal injuries which resulted fatally.
30	〃	June 17th	Toy	〃	Leg broken and head injured by a fall of top coal while at work in his stall in No. 3 North Level, No. 6 Shaft.
31	〃	July 4th	Wong Foo	〃	Fatally injured in his working place in No. 4 Level, No. 4 Slope, by a fall of top coal.
32	〃	〃 15th	Jung Bing	〃	The first 16 named were killed, and the other 4 were slightly burned by an explosion of gas in No. 3 incline, No. 6 Shaft. This district was worked exclusively with locked safety lamps. On this date a big break occurred all over this district, liberating a considerable quantity of gas. When I arrived, on the evening of the 16th, the roof was breaking high up and considerable gas being given off. There were 15,000 cubic feet of air going through this district per minute, and there was half an inch of cap on the flame of my safety lamp in the return air course. This accident would not have occurred if there had been no other lights than locked safety lamps. Matches, tobacco and cigarettes were found in the working places and on the Chinamen that were killed; also an open safety lamp and one broken safety lamp in the place where the explosion occurred, showing negligence on their part. An inquest was held and the verdict of the jury is on record at the Attorney-General's office.
33	〃	〃 15th	Jung Bow	〃	
34	〃	〃 15th	Jung B. How..	〃	
35	〃	〃 15th	Wong Tong...	〃	
36	〃	〃 15th	Ting Tah	〃	
37	〃	〃 15th	Wong Yuen...	〃	
38	〃	〃 15th	Chong Chi	〃	
39	〃	〃 15th	Mah Ching....	〃	
40	〃	〃 15th	Mah See......	〃	
41	〃	〃 15th	Mah Dow	〃	
42	〃	〃 15th	Mah Lee......	〃	
43	〃	〃 15th	Chong	Driver	
44	〃	〃 15th	Mah Chong ...	Runner	
45	〃	〃 15th	Lan Doo	〃	
46	〃	〃 15th	Chong Doo....	〃	
47	〃	〃 15th	Mah Lee.....	Miner	
48	〃	〃 15th	Mah Ming	〃	
49	〃	〃 15th	Swan Yock ...	〃	
50	〃	〃 15th	Ah Min.......	〃	
51	〃	〃 15th	Ging	〃	
52	Nanaimo	〃 20th	J. Cartwright..	〃	Leg broken by a fall of coal while at work in his stall in Protection Mine.
53	Extension.....	Aug. 14th	Fred Chadwick	〃	Leg broken by tripping over a rope and part of a motor trip of empty cars passing over him in No 3 Mine.
54	Union	Oct. 3rd	D. Potter	〃	Leg broken by a fall of rock while taking down some coal in his stall in No. 4 Slope.

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1903.—*Continued.*

No.	Colliery.	Date.		Name.	Occupation.	Remarks.
55	Union	Oct.	3rd	Chung	Miner-helper ..	Leg broken by a fall of rock in the counter Level No. 9, No. 4 Slope.
56	Nanaimo	"	3rd	David Williams	Miner	Small bone of his foot broken and injured about the back by a fall of rock in his place.
57	Extension.....	"	8th	James Sharpe .	Overman......	Legs injured in No. 3 Mine while examing a place, through a shot fired in the next stall, which he thought was idle.
58	"	"	13th	(Chinaman) ...	Labourer	Fatally injured at the pit head by slipping in front of loaded train of cars.
59	"	"	13th	Daniel Colvin .	Miner	Killed by a fall of coal while at work in his place in No. 2 Mine.
60	Union	"	16th	Wong Don Yet	"	Leg broken and ribs bruised by a fall of rock in his place in No. 6 pit.
61	Extension.....	"	19th	S. Lavisone ...	"	Leg and arm broken in the tunnel through being caught by motor trip.
62	"	"	24th	Sam. Horrocks.	Driver	Slightly burned by gas near the face of No. 2 Slope.
63	Union	Nov.	4th	Sing Lee......	Miner	Severely injured (compound fracture left arm and left leg fractured) by a fall of middle rock, while at work in his place in No. 5 Shaft.
64	"	"	9th	A. Marinella ..	"	Wrist broken by a car while at work in the Slope in No. 5 Shaft.
65	Extension.....	"	20th	Walter Hunter	"	Fatally injured by fall of coal while at work in his place in No. 3 Mine.
66	"	"	21st	Wm. Manuel..	Runner	Slightly injured by being squeezed between a box and a post, while at work in the Tunnel mine.
67	Union	"	27th	(Chinaman) ...	Miner	Leg broken by a fall of coal while working in his place in No. 7 Level, south of No. 2 Slope of No. 4 Mine.
68	"	Dec.	13th	Jos. Crosette..	"	Leg broken (making amputation necessary) and severely injured in No. 4 Slope through being run over by trip of cars.
69	Extension.....	Dec.	14th	John Swar....	"	Had his leg broken while at work in his place by a slip of coal falling from the face.
70	Union	"	18th	Kig (Jap)	"	Leg broken by a rope in No. 7 East Level of No. 2 Slope, No. 4 Mine.
71	"	"	24th	Chung	Labourer	Killed by a runaway trip. He was walking on the slope when a link broke, allowing part of the trip to run back, and it caught him at No. 7 Level, No. 1 Slope, No. 4 Mine.

Detailed Statement of Accidents in B. C. Collieries During 1903.—*Continued.*

Reported by James McGregor, Inspector of Crow's Nest Collieries.

No.	Colliery.	Date.		Name.	Occupation.	Remarks.
1	Morrissey	Jan.	15th	Simon Ivey	Miner	Caught between two cars on the tipple and sustained fracture of right arm.
2	〃	〃	16th	John Kobus	Back-hand	Had his right leg fractured by his being caught with McGinty rope in No. 4 Mine.
3	〃	〃	26th	John Krall	〃	Killed in No. 1 Mine, Morrissey, by a car going over the rails and knocking out a prop which struck him on the head.
4	Michel	April	9th	Elias Parke	Miner	Burned about the hand by gas in No. 8 Mine.
5	〃	〃	9th	F. Copolongs	Back-hand	Burned about the face and hands by a slight explosion of gas in No. 8 Mine.
6	Coal Creek	〃	11th	Jas. Yuskh	Driver	Was slightly injured by runaway horse in No. 2 Mine.
7	〃	〃	11th	Sam Armstrong	Shiftman	One rib fractured while helping to put a car on the track in No. 2 Mine.
8	〃	〃	24th	Robt. Ramsay	Miner	May lose the sight of one eye through premature explosion of a shot in No. 2 Mine.
9	〃	May	12th	Geo. Harding	〃	Fatally injured by being caught between a mine car and a prop in No. 2 Mine.
10	Morrissey	〃	21st	Frank Burton	〃	Slightly injured by a fall of rock in No. 4 Mine.
11	Michel	〃	27th	Walter Worthington	Pusher	Killed by a fall of rock in No. 5 Mine, through car knocking out the timber.
12	〃	〃	27th	Tony Micona	〃	Ankle injured in above accident.
13	Morrissey	June	26th	Jos. P. Horan	Brakeman	Killed by the locomotive going over him on the high line railway.
14	〃	〃	28th	R. McKnight	Loader	Was slightly bruised about the body by coal falling in No. 4 Mine.
15	〃	〃	29th	Jno. A. Savage	Driver	Injured above the eye and on back by a falling timber in No. 3 Mine.
16	Michel	July	18th	Jno. Powers	Miner	Burned on the back of hand by a small explosion of gas in No. 8 Mine.
17	Coal Creek	〃	23rd	Chas. Edgar	〃	Left leg fractured by being caught in a rope in No. 2 Mine.
18	Michel	Sept.	27th	John Nuzzie	Rope-rider	Found dead under the car in No. 4 Mine Slope, but how he came there not known.
19	Coal Creek	Oct.	14th	Fred Scott	Miner	Killed by a fall of coal in No. 1 Mine through the breaking of a boom in the face of the room where he was working.
20	Morrissey	Oct.	15th	A. Herbenaugh	〃	Suffocated (and killed) by an outburst of gas in No. 1 Mine, Morrissey.
21	〃	〃	15th	Tony Micone	〃	
22	〃	〃	15th	John Rogers	〃	
23	〃	〃	15th	Ignace Kenpa	〃	

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1903.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Remarks.
24	Michel	Oct. 23rd	Jno. Edwards.	Miner	Legs broken and cut about the head by a fall of rock in No. 4 Mine.
25	Coal Creek....	Nov. 24th	Em. Bloomer..	"	Killed by a fall of rock in No. 2 Mine while at work in his stall.
26	Morrissey.....	" 24th	S. Kenbensick.	Rope-rider ...	Killed in No. 4 Mine by the mine car running over him.
27	Coal Creek....	" 16th	Wm. Quigg ...	Miner	Fatally injured by the motor in No. 1 Mine.
28	Michel	Dec. 11th	Chas. Lessen..	"	Slightly burned about the hand and face by an explosion of gas in No. 8 Mine.
29	Coal Creek....	" 22d	Steph'n Hunter	"	Killed by a fall of roof at the face in No. 1 Mine.
30	Michel	" 24th	Michael Zagara	Timberman ...	Killed by a fall of rock when he was repairing a road in Upper No. 3 Mine.

LIST OF CROWN-GRANTED MINERAL CLAIMS.

CROWN GRANTS ISSUED IN 1903.

CASSIAR.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Alvine	Atlin	Frank Laverdière	247	51.65	March 12
Butte	〃	John Caplice	304	34.60	〃 11
Discovery	〃	C. Christopher and Nellie H. Runnalls	184	51.65	〃 25
French	〃	Tom Laverdière	246	48.87	〃 12
Great Falls	〃	John Caplice	306	40.15	〃 11
Gold	〃	Wm. Beavis	251	51.65	〃 12
Gold No. 2	〃	〃	252	49.40	〃 12
Helena	〃	John Caplice	305	48.90	〃 11
Holy Cross	〃	Noel Laverdière	245	49.19	〃 12
Rock of Ages	〃	J. M. Ruffner, W. G. Mitchell *et al.*	185	51.02	〃 15
Sydney Fraction	〃	Wm. Beavis	253	43.06	〃 12

LILLOOET.

Cosmopolitan	Lillooet	Paul Santine and F. Richardson	584	40.34	March 13
Goodenough	Clinton	J. B. MacLaren	563	51.65	〃 28
Last Chance	〃	〃	564	43.30	〃 28
McKinley	Lillooet	D. Fraser, A. McDonald *et al*	648	23.85	Aug. 24

WEST KOOTENAY.

Ace of Diamonds	Trail Creek	Neville F. Townsend	3378	32.20	Feb. 11
American	Ainsworth	Henry Giegerich	5851	34.90	March 18
Acme	〃	〃	5852	38.94	〃 30
Anaconda	Nelson	Frank Bowser	2071	49.50	May 13
Alexandria	〃	L. J. D. Berg and Prudence Berg	2422	48.96	June 15
Annie L	Ainsworth	Ophir Lade Mg. Synd	4724	40.90	〃 22
Arabian	Revelstoke	Florence McCarty	2733	51.65	Aug. 3
Alice No. 5	Slocan	Patrick McCue	4567	24.66	〃 7
Andrew Jay	Ainsworth	〃	5304	51.65	〃 7
Aurora	Nelson	B. C. Standard Mg. Co., Ltd	6064	47.86	Dec. 22
Baltimore	Slocan	G. H. Dawson	5755	26.86	Feb. 12
Black Hawk Fr.	〃	American Boy M. and M. Co	4546	17.82	March 31
Buffalo	Nelson	Mike Morris and Rose McGlynn	3385	49.74	May 13
Balfour	Lardeau	C. Menhinick, J. J. Foley *et al*	4777	25.62	〃 14
Beatrice	〃	Jos. Boucher, F. F. Fullmer *et al*	4586	51.65	June 11
Blossom Fraction	Slocan City	A. B. Coleman	4774	13.31	July 3
Belcher	Revelstoke	Florence McCarty	2735	49.66	Aug. 3
Banner	Lardeau	W. B. Clark	3085	37.08	Sept. 10
Brow	Trout Lake	G. C. and W. H. Lembke	5687	49.80	〃 15
Bonanza No. 2	Trail Creek	S, Barbora and S. J. Brailo	5718	49.00	Oct. 5
Bristol	Nelson	R. R. Burruss, T. Stout *et al*	4938	26.40	〃 26
Bell	Slocan	J. D. Farrell, V. D. Williamson *et al.*	2844	46.49	Nov. 25
Ben Bolt	Trail Creek	John Weir	4256	24.48	Dec. 21
Big Casino	〃	〃	4257	35.50	〃 21
Black Prince Fr	Slocan City	J. Elliot, R. A. Bradshaw *et al*	584	5.60	〃 23

WEST KOOTENAY.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Coeur d'Alene	Trail Creek	Jno. Powers	3418	51.65	Feb. 17
Cashier	Nelson	Arthur V. Powys	4399	48.74	〃 17
Carmencita	〃	Robt. C. Pollett	5201	48.13	〃 17
Congress	Ainsworth	Geo. Alexander	513	45.93	March 24
Centenial	Nelson	Jno. Sibbald	5386	25.81	〃 30
C. and K.	Slocan	W. H. Brandon and C. Kloepfer	5974	30.39	April 16
Chieftain	Arrow Lake	J. Brown, P. Burns *et al*	5845	7.93	〃 25
Cracker Jack	Lardeau	Great Western Mines, Ltd	4504	42.32	May 4
Clara G.	Ainsworth	Duncan River Co-operative M. and D. Co.	4713	51.65	〃 5
Coliseum	Nelson	Frank Bowser	2072	47.62	〃 13
Criterion	Lardeau	Ophir Lade Mg. Synd.	5417	15.76	〃 13
Copper Reef	Trout Lake	Great Western Mines, Ltd	4957	41.74	June 12
Colorado	Ainsworth	Patrick McCue	5308	27.13	Aug. 28
Culbert	Trout Lake	Wm. Nathaniel Brayton	1367	45.30	Sept. 12
Cameronian	Slocan City	Cameronian G. and S. Mg. Co	5976	40.65	Oct. 27
City of Cleveland	Trail Creek	Wm. A. Spilker	5853	49.00	Nov. 30
Comstock	〃	Jas. R. Roaf	5864	46.47	Dec. 23
Diamond Flush	〃	N. F. Townsend	3377	31.00	Feb. 11
Don Fraction	Trout Lake	Jas. M. Aikins *et al*	4583	9.57	March 12
Daisy	Ainsworth	King Solomon's Mg. Co	3351	28.40	〃 17
Dixie Fraction	〃	〃 〃	4755	8.40	〃 17
Dundas	Arrow Lake	Jno. Brown, W. G. Clark *et al.*	5843	30.34	April 25
Duchess	〃	〃 〃	5846	20.72	〃 25
Double Standard	Nelson	B. C. Standard Mg. Co.	2213	43.56	Dec. 22
Dalkeith	Slocan	Wakefield Mines, Ltd	2603	41.67	〃 23
Exchange	Slocan City	Horace G. Van Tuyl	1523	36.80	March 13
Emma	Ainsworth	Duncan River Co-operative M. and D. Co.	4714	48.80	May 5
Endora	〃	〃 〃	4715	51.65	〃 5
Echo	Slocan	W. S. Drewry and T. Airson	4858	16.09	June 2
Edmond	Lardeau	Jos. Boucher, F. Fullmer *et al.*	2634	51.53	〃 11
Empress	〃	Minnesota M. and D. Co., Ltd.	5671	48.16	〃 12
Ethel Fraction	Slocan	Robt. Ewin	5880	6.76	Aug. 20
Editor	Nelson	R. S. Lyons and W. H. Jones	5861	46.70	Sept. 15
Erie	Ainsworth	G. F. Cleveland, F. E. Archer *et al.*	1029	50.68	Oct. 26
Florence M. Fract.	〃	King Solomon's Mg. Co	3350	38.10	March 17
Folsom	Lardeau	J. Boucher, F. Fullmer *et al.*	4587	51.65	June 11
Foundation	Ainsworth	Ophir Lade Mg. Synd.	4725	51.65	〃 22
Fairview	Revelstoke	Florence McCarty	2767	51.65	Aug. 3
Falls View No. 2	Slocan City	J. F. Holden	6055	51.00	Dec. 22
Golden Gem	Nelson	Arthur V. Powys	4400	48.07	Feb. 17
Golden Eagle	Revelstoke	L. L. Graham and G. Lund	2725	34.44	March 13
Gold Finch	〃	Northwestern Dev. Synd., Ltd	5654	40.45	〃 17
Great Western	Lardeau	Great Western Mines, Ltd	4503	33.89	May 4
Gold Bug Fract.	〃	Ophir Lade Mg. Synd., Ltd.	5419	32.50	〃 13
Grace	Slocan	Selkirk M. and Mg. Co., Ltd	5532	44.92	June 15
Goldenville	Ainsworth	Ophir Lade Mg. Synd., Ltd.	4720	48.52	〃 22
Golden Hope Fract.	Arrow Lake	Thos. Abriel	5415	35.36	July 3
Glengarnock	Trout Lake	Lardeau Valley Mines, Ltd.	5897	51.30	〃 3
Grey Eagle	Nelson	Campbell Sweeny	1488	45.09	Aug. 18
Gold Note	〃	Aaron H. Kelly	616	28.81	〃 20
Government	Goat River	Valparaiso Gold M. Co., Ltd	4908	43.70	〃 27
Gibraltar No. 2	Arrow Lake	John L. Farwig, J. Z. Hall *et al.*	5873	28.11	Nov. 26
Golden Rodd No. 2.	〃	J. R. Jamieson and T. Matthews	5877	46.55	〃 26
Helena	Trail Creek	Jno. Powers	3417	51.65	Feb. 17
Home Rule	Slocan	M. McAndrews	2055	42.08	June 25
Hamilton	Slocan City	A. B. Coleman	4771	51.57	July 3
Hamilton Fr.	〃	〃	5968	7.78	〃 3
Hiawatha	Nelson	J. H. Moran, C. W. Greenlee *et al.*	4770	51.31	Aug. 14
H. M. Fract.	Lardeau	Imperial Synd., Ltd	5179	.24	〃 27
Handy	Trout Lake	W. N. Brayton	1369	20.50	Sep. 12
Halifax	Arrow Lake	J. R. Jamieson and T. Matthews	5874	45.59	Nov. 26
Hailstorm	〃	〃 〃	5875	51.65	〃 26

WEST KOOTENAY.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Highland Chief....	Nelson	British Lion G. M. & Dev. Co., of Ontario..	5620	44.60	Nov. 27
Hunter V.........	〃	B. C. Standard Mg. Co., Ltd	2212	49.09	Dec. 22
Iron Age.....	〃	Lorne A. Campbell..........................	5129	35.57	Feb. 11
Imperial....	Lardeau	C. Menbinick, J. J. Foley *et al*...........	4778	13.76	May 14
Interloper Fr......	Trout Lake .	Lardeau Valley Mines, Ltd..	2443	6.60	July 3
Iron Horse No. 2 ..	Slocan City .	Thos. A. Noble	5663	39.67	〃 28
Iron Cap..........	Nelson	Campbell Sweeny	1487	37.29	Aug. 18
Iola	Lardeau	W. B. Clark..	3084	42.35	Sep. 10
Iron Chief	Ainsworth ..	Anna K. Paulson	5669	34.72	Nov. 27
Jinnie	Slocan City .	A. B. Coleman..	4773	51.61	July 3
John L	Trout Lake .	Lardeau Valley Mines, Ltd...............	5898	3.00	〃 3
Joker	Nelson	R. R. Shrum, H. A. Van Buskirk *et al*.....	5388	37.02	〃 6
Joplin	〃	Chas. W. Young.......................	5571	39.63	Oct. 13
Jungle Fr.........	Trail Creek .	Ephraim B. Sentell.........................	3603	33.86	Dec. 21
Keewatis	Slocan.	Monitor and Ajax Fract., Ltd............	5761	46.68	March 31
Kitty	Lardeau	Minnesota M. and D. Co., Ltd............	5672	51.65	June 12
King Alfred	Nelson	Frank W. Lewis..........................	3368	47.62	Nov. 2
King Solomon.....	〃	〃	3369	20.95	〃 2
Kamloops.........	Trout Lake .	Harry Abbott	3480	35.93	〃 10
Kelso	Slocan......	Wakefield Mines, Ltd........	2604	40.47	Dec. 23
Lone Star.........	Trail Creek .	Neville F. Townsend	3379	42.70	Feb. 11
Le Roi	Slocan.....	Geo. H. Dawson	5754	36.10	〃 12
Lulu Belle Fract...	Trout Lake .	Gt. Western Mines, Ltd.................	4958	9.74	May 7
Ladysmith	Nelson	L. J. D. Berg and Prudence Berg.........	3415	51.65	June 15
Little Estella Fr...	Slocan	Selkirk M. and M. Co., Ltd..............	5534	19.68	〃 15
Liberal	Ainsworth ..	Erl Synd., Ltd., and D. J. Munn..........	2271	39.80	〃 17
Liza Fract	Trout Lake .	Lardeau Valley Mines, Ltd...............	5900	18.30	July 3
London Fract	Slocan City .	Thos. A. Noble	5664	26.73	〃 3
Lone Star.........	Trail Creek .	Andrew Daly..........	4675	47.97	Aug. 26
Lynch	Trout Lake .	W. N. Brayton	1368	22.30	Sep. 12
Low..............	〃 ..	〃	1370	51.30	〃 12
Londonderry	Arrow Lake.	J. B. Jamieson and T. Matthews	5876	51.65	Nov. 26
Monadonock	Nelson	Chas. Faas and W. H. Crawford........ .	5743	42.05	Feb. 13
Morris............	Slocan City .	Arlington Mines, Ltd.......................	5273	34.43	March 16
Morning Star.. ...	Trout Lake .	Jno. Abrahamson	4574	51.65	〃 27
Mogul Fract	Ainsworth ..	C. W. Greenlee and J. H. Moran..........	5744	17.84	April 3
Mogul............	〃 ..	〃 〃	5745	50.93	〃 3
Miller Creek Fr ...	Slocan......	Gus Fandrey	5191	38.09	〃 18
Mammoth No. 2...	Arrow Lake.	J. Brown, W. G. Clark *et al*.	5841	33.82	〃 25
Moscow	Lardeau	Double Eagle M. and D. Co., Ltd.........	4500	28.23	May 4
Montreal.........	Slocan City .	Pioneer Mg. Co., Ltd.....	3328	42.50	〃 21
Minnie	Slocan......	Selkirk Mg. and Mg. Co....	5535	39.39	June 15
Midget	Trail Creek .	R. Marsh and C. F. Taylor	4936	23.96	May 27.
Maggie May	Trout Lake .	Lardeau Valley Mines, Ltd...............	2437	47.80	July 3
Maggie May No. 2.	〃 .	〃 〃	2442	36.30	〃 3
Mareyen Fract	〃 ..	〃 〃	5899	4.30	〃 3
Maple Leaf	Revelstoke..	Florence McCarty.....	2766	35.93	Aug. 3
Mammoth II......	〃 ..	〃	2768	15.65	〃 3
Minnehaha........	Nelson	J. H Moran, C. W. Greenlee *et al*.........	4769	51.65	〃 14
Maggie	〃	J. W. Roof..............................	617	21.06	〃 20
Mountain Chief ...	Arrow Lake.	P. McDonald, W. Ross *et al*...............	5848	39.67	Nov. 27
Mercia Fr	Nelson	B. C. Standard Mg. Co., Ltd..............	2224	18.37	Dec. 22
Norman	Ainsworth ..	C. W. Greenlee and J. H. Moran..........	5746	22.92	April 3
No. 1 Fr..........	Trout Lake .	Gt. Western Mines, Ltd..................	5688	3.59	June 12
Nettie L. Fr	〃 ..	〃 〃	5689	8.90	〃 12
Nellie	Lardeau	Minnesota M. and D. Co.................	5670	51.53	〃 12
Nellie Fr.........	〃	〃 〃	5674	4.09	〃 12
New Bonanza	Trail Creek .	S. Barbora and S. J. Brailo	5717	31.90	Oct. 5
North Branch	Ainsworth ..	King Solomon's M. Co. *et al*...............	5825	51.65	Dec. 11
Ore Hill..........	Nelson	Godfrey Birtsch..........	2073	51.65	March 12

WEST KOOTENAY.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Oom Paul	Slocan	W. H. Brandon and C. Kloepfer	5973	20.49	April 16
Oyster	Lardeau	Ophir Lade Mg. Synd	5416	42.51	May 13
Oregon	Ainsworth	Erl Synd., Ltd.	2275	37.20	June 2
Oom Paul	Lardeau	Minnesota M. and D. Co., Ltd	5673	14.61	〃 12
Olive Mabel	Ainsworth	Ophir Lade Mg. Synd.	4723	32.28	〃 18
Ontario No. 6	Slocan City	Chas. W. McMillan	5741	48.73	Aug. 15
Ophir	Ainsworth	Ophir Lade Mg. Synd	4721	50.60	Sep. 15
One Eye See	Trail Creek	Alivida Simpson	3390	25.89	Nov. 20
Port Hope	Slocan City	Julia Baty, H. L. Fife *et al.*	5493	41.20	March 13
Penobscot	Slocan	M. R. W. Rathborne and F. Culver	3367	51.60	〃 17
President	Trout Lake	A. Abrahamson, F. H. Bourne *et al*	4578	37.39	〃 27
Pocket Lake	Ainsworth	Adam Swencisky	5633	51.65	April 4
Prudence	Nelson	L. J. D. Berg and P. Berg	3416	48.37	June 15
Pay Ore Fr..	Ainsworth	Pat McCue	5309	25.69	Aug. 7
Portland	Arrow Lake	M. E. King	5855	41.50	Oct. 23
Pamlico	Slocan	J. D. Farrell, V. D. Williamson *et al.*	2843	50.55	Nov. 25
Paru	Slocan City	George Brim	5662	41 22	〃 17
Rosalia	Nelson	Jno. Sibbald	5385	26.55	March 30
Return	Slocan	Payne Consolidated Mg. Co., Ltd	1018	13.62	May 8
Rossland	Lardeau	Cory Menhinick and J. J. Foley	4775	21.86	〃 13
Ruby Fract	Trout Lake	Lardeau Valley Mines, Ltd.	2444	.08	July 3
Rock Bolder	Ainsworth	Patrick McCue	5305	27.13	Aug. 7
Robson	Arrow Lake	Geo. D. Brymner	5408	39.04	Sep. 8
Rey del Cerrerres	Trout Lake	H. Abbott	6038	49.72	Nov. 10
Silver Wedge Fr	Slocan	Geo. H. Dawson	5756	6.80	Feb. 12
Smuggler	Nelson	Chas. Faas, C. W. Greenlee *et al*	5742	51.65	〃 13
Spotted Horse	〃	C. J. Ditter, J. J. McMullen *et al.*	5375	36.84	〃 17
St. Elmo	Trout Lake	Jas. M. Aikins *et al*	4581	49.11	March 12
Silver Plate	Slocan City	Horace G. Van Tuyl	1524	47.00	〃 13
Slug Ten	〃	P. W. Ellis *et al.*	5972	47.79	〃 13
St. Anthony Fr	Ainsworth	King Solomon's Mg. Co	3349	17.30	〃 17
Superior Fr	〃	〃 〃	4756	7.30	〃 17
Spokane-Kaslo	〃	Henry Giegerich	5849	40.71	〃 30
Spokane-Kaslo No. 2	〃	〃	5850	34.64	〃 30
Silver Queen	〃	Robt. F. Dodd and J. L. G. Abbott	3374	51.65	April 16
Silver Queen Fr	〃	〃 〃	3375	51.65	〃 16
Silver Tip No. 2	Arrow Lake	J. Brown, W. G. Clark *et al.*	5847	51.46	〃 25
Shepherd's Star	Nelson	J. B. MacLaren	3280	44.56	June 2
Spokane	Trout Lake	Lardeau Valley Mines, Ltd.	1366	38.60	July 3
Shamrock	Revelstoke	Florence McCarty	2769	49.23	Aug. 3
Stockholm Fr	Lardeau	Imperial Dev. Synd., Ltd	5424	1.13	〃 25
Side Line	Ainsworth	Jas. W. Smith	2366	28.42	Sep. 15
Silver Bullion	Nelson	B. C. Standard Mg. Co., Ltd	3421	47.15	Dec. 22
Tornado	Slocan	Selkirk M. and M. Co., Ltd	5537	44.12	June 15
Toronto	Slocan City	A. B. Coleman	4772	43.14	July 3
Two and a half	Trout Lake	Ophir Lade Mg. Synd.	4722	36.55	Nov. 18
The Brothers	Trail Creek	Eph. B. Sentell	3602	47.95	Dec. 21
Tugalla	Nelson	B. C. Standard Mg. Co., Ltd	3419	22.19	〃 22
Tamarack No. 2	Slocan City	Jno. F. Holden	6054	51.50	〃 22
Utica	Ainsworth	Patrick McCue	4566	51.65	Aug. 7
Virginia May	〃	Duncan River Co-operative M. and D. Co.	4712	51.65	May 5
Victoria IV	Revelstoke	Florence McCarty	2734	51.63	Aug. 3
Vulcan Fract	Trail Creek	Andrew D. Provand	3397	16.93	〃 25
Virginia	Ainsworth	G. F. Cleveland, F. E. Archer *et al*	1028	50.34	Oct. 26
Vulgar Fr	Nelson	B. C. Standard Mg. Co	3420	2.78	Dec. 22
Wasa	Slocan City	New Gold Fields of B. C., Ltd.	3887	31.14	March 11
White Quail	Trout Lake	A. Abrahamson and F. H. Bourne	4577	51.65	〃 27
White Eagle	Ainsworth	J. D. Byrne	5634	51.65	April 8
Wales Fr	Trout Lake	Harry Abbott	6037	25.32	Nov. 10

WEST KOOTENAY.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Yankee	Trout Lake	Jas. M. Aikins *et al.*	4582	37.15	March 12
Young Canuck	Lardeau	Gt. Western Mines, Ltd	4501	51.65	May 4
Yosemite Fr	Ainsworth	Erl Syndicate, Ltd	2270	9.03	June 2
You Know	Lardeau	J. A. Magee	4493	18.98	Aug. 12
Zoa	Ainsworth	King Solomon Mg. Co	4753	37.60	March 17

EAST KOOTENAY.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Ashland	Fort Steele	Jos. H. Wright	5461	36.57	March 13
Alma	〃	〃	2078	47.78	Aug. 25
Ben d'Or	〃	J. C. Green, J. L. Parker *et al.*	3773	43.03	March 19
Belleville	〃	Wm. J. Hamilton	5253	51.65	May 16
Bracebridge	〃	Jos. H. Wright, O. H. Burden *et al.*	5037	51.65	〃 22
Buttercup	Windermere.	R. S. Gallop *et al.*	5354	48.95	July 24
Copper King	Fort Steele	Jno. Swenson	6028	49.50	May 12
Denbigh	〃	J. H. Wright, O. H. Burden *et al*	5576	35.00	Nov. 25
Fisher	〃	Fred Cogle *et al.*	5287	15.88	April 14
Gt. Northern	Windermere.	R. S. Gallop *et al.*	5358	43.63	July 24
Hidden Hand No. 2	Fort Steele	Ed. C. McKinstry *et al*	4086	37.37	March 17
Hot Boy	Windermere.	R. S. Gallop *et al.*	5361	23.65	July 24
Hillside	Fort Steele	Jos. H. Wright	2076	37.71	Aug. 25
Jackson	〃	J. H. Wright	2077	50.11	〃 25
Kedive	〃	David Griffith	5804	45.83	April 1
La Vida	〃	Jno. Swenson	6027	48.34	May 12
Look Out	〃	W. J. Hamilton	5254	51.65	〃 14
Maple Leaf Fr	〃	N. Star Mg. Co	2319	1.73	April 3
Mark Creek	〃	Chas. C. Farrell	2043	51.65	〃 4
Maid of the Mountain	〃	Jno. Swenson	6026	51.65	May 12
Monitor	〃	R. S. Gallop *et al.*	5355	40.32	July 24
Old Abe	〃	J. S. Parker, J. C. Green *et al*	3774	49.35	June 15
Omdurman	〃	David Griffith	5803	51.20	April 1
Prospector's Dream	〃	J. C. Green and J. S. Parker	3772A	51.65	March 18
Phœnix	Windermere.	R. S. Gallop	5359	50.23	July 24
Regina	Fort Steele	J. H. Wright, O. H. Burden *et al*	5575	48.07	Nov. 23
South Side	Windermere.	R. S. Gallop	5360	48.73	July 24
Sultan	Fort Steele	Jos. H. Wright	2075	49.23	Aug. 25
White Star	〃	Fred Coyle *et al*	5286	27.57	April 14
World's Fair	Windermere.	R. S. Gallop *et al.*	5356	50.29	July 24
Wilderness	〃	〃	5357	30.79	〃 24

YALE.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Alabama	Similkameen	Jno. Stillwell Clute	2429	51.65	March 16
Arlington	Grand Forks	Frank Asprey	2596	44.65	〃 16
Ajax	Greenwood	Forbes M. Kerby	2367	51.46	〃 17
Amandy	〃	Jas. Hunter	2795	50.52	April 14
Ah There	〃	Geo. D. Lyson	1960	17.75	June 2
Achme	Osoyoos	C. de B. Green	1074	49.00	July 2
Astoria	Greenwood	Sidney Rosenhaupt	3134	50.72	Nov. 19
Arcadia	〃	〃	3135	21.70	〃 19
Alice	〃	W. G. McMynn, D. McLaren *et al*	2579	51.65	Dec. 21
British	Osoyoos	British Lion G. M. Co., Ltd.	1987	51.65	Feb. 26
British Lion	〃	〃 〃	1988	41.50	〃 26
Black Tail	Grand Forks	Geo. W. House	2284	45.10	April 3
Bertha (frac)	Osoyoos	Jacob Rink *et al*.	2677	16.00	〃 18
Bluebell	Grand Forks	Wm. Shaw, T. W. Stack *et al*	2136	48.40	June 9
Brigman	Similkameen	Mira Monte Mg. Co., Ltd	1102	49.37	〃 18
Bank of England	〃	John E. Bate	1130	29.80	〃 18
Baltimore	Greenwood	J. A. Moody	2391	44.82	〃 26
Blue Bell	Osoyoos	Geo. G. Powell and E. Morris	1902	51.65	Aug. 3
Best	Grand Forks	C. Hay and N. McCallum	1616	39.84	〃 10
Bonanza	〃	〃 〃	1617	16.83	〃 10
Bolton Fr	Greenwood	I. H. Hallett and Geo. R. Naden	1706	27.28	Oct. 27
Beaver	〃	J. T. Bell, D. Murray *et al*	2342	38.31	〃 28
Boston	〃	F. Darragh and W. Lacy	5717	31.90	〃 2
Betts	Grand Forks	C. J. Magee	3056	42.25	Nov. 24
Big Horn	Kamloops	Cinnabar Mg Co. of B. C	927	43.23	〃 28
Brookline	Greenwood	R. J. Bayes and H. Reed	1032	45.75	Dec. 21
Bench Fr	Similkameen	H. McRae, J. McKay *et al*	119	3.55	May 22
Champion	Kettle River	C. D. Temple	2863	47.86	March 26
Carlotta	Greenwood	Andrew Poggi and F. J. Finucane	2943	51.65	June 1
Cincinnatti	Similkameen	Samuel J. Bate	1127	44.34	〃 18
Copper Bntte Fr	〃	〃	1128	22.15	〃 18
Covington	〃	Portland Mg. Co., Ltd	1123	51.56	Aug. 3
Cleopatra	Grand Forks	C. Hay and Neil McCallum	1615	43.49	〃 10
Cornwall	Greenwood	P. B. S. Stanhope	2571	47.32	Oct. 13
Copper Cliff	Similkameen	Peter E. Wilson	1939	39.52	〃 26
Copper Bluff	〃	〃	1940	39.85	〃 26
Caledonia	Grand Forks	Chas. Staynor Wallis	1756	49.20	Nov. 20
Copper Queen	〃	Jno. Mulligan	1949	44.29	〃 27
Climax	〃	I. H. Hallett and J. F. Cunningham	2113	46.07	〃 28
Civil	Kamloops	Wm. Buxton, R. Blair *et al*	1068	1.77	Dec. 14
Colorado	Greenwood	A. Waddell and W. G. McMynn	2641	34.22	〃 18
Denver	〃	C. D, Temple	2862	49.38	March 26
Deadwood	〃	Geo. D. Leyson	1962	48.86	May 28
Daisy	Similkameen	S. R. Almond and J. Snowden	816	51.65	June 2
Denver	Grand Forks	Olive B. Jones	2410	51.22	July 3
Deerhorn	Greenwood	Rose C. Davey	1714	30.16	Nov. 12
Dandy	〃	S. M. Johnson	1259	44.70	Oct. 9
Dominion Fr	Vernon	Henry G. Muller	2541	24.50	〃 13
Denver	Greenwood	A. A. McIntosh and W. H. Spence	2875	50.70	Nov. 28
Excelsior	Grand Forks	Vancouver & Boundary Ck. Dev. & M. Co	2609	46.37	Feb. 16
Exchange Fr	Osoyoos	Myron K. Rodgers	725	12.80	March 20
Eureka	Grand Forks	J. F. Miller	1145	42.82	Aug. 21
Elkhorn	Osoyoos	J. M. Sharp and W. J. Brewer	2057	51.65	Sep. 16
Excelsior	Kamloops	Cinnabar Mg. Co. of B. C	926	51.50	Nov. 28
Eureka	〃	〃 〃	928	51.65	〃 28
Emeroy	〃	Jno. Beaton	1050	43.28	〃 30
Erin	〃	W. Buxton, R. Blair *et al*	1066	34.57	Dec. 14
Elmer No. 2	Grand Forks	I. Robt. Jacobs and S. E. Lictenheim	2334	49.73	〃 21
Fanny H. Fr	Greenwood	No. 7 Mining Co., Ltd	1643	13.61	Oct. 27
Fourth of July	〃	Alex. Waddell and E. Sullivan	2638	50.75	Dec. 18
Fraser	Similkameen	H. McRae, J. Mackey, &c.	231	47.15	May 22
Fraser Fract	〃	〃 〃	226	8.75	〃 22

YALE.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Gold Bug No. 2	Greenwood	Chris. W. Stack and T. W. Stack	1718	51.65	Feb. 13
Gold Finch	〃	C. W. H. Sansom	820	39.07	May 7
Georgia	Similkameen	Mira Monte Mg. Co	1101	51.65	June 18
Grand Forks Belle	Grand Forks	Chas. Hay and N. McCallum	1618	37.26	Aug. 10
Gem Fract	〃	Jas. F. Cunningham	2139	11.80	〃 12
Galena	Osoyoos	Peter Scott	2667	38.11	Oct. 12
Golden Age Fr	Grand Forks	Arthur Jordan	3044	31.55	〃 28
Gladiator	Kamloops	Jno. R. Hall and E. H. Jones	872	43.80	Dec. 11
Homestake	Greenwood	Syd. M. Johnson, A. Megraw *et al*	1892	49.26	Feb. 12
Hunter	〃	Owen Mellon	2859	35.28	March 26
Honolulu	〃	W. H. McMackon and T. R. McMackon	1572	43.59	April 8
Highland Chief	〃	Fayette Harris	2345	51.65	May 7
Hamilton	Similkameen	H. McRae, J. Mackay *et al*	127	51.08	〃 22
Hercules	Greenwood	Edw. L. Tate	926	22.58	June 25
Hastings	Grand Forks	Jas. T. McKenzie, Nev. Smith *et al*	2053	51.65	Aug. 27
Hillside	Oroyoos	J. M. Sharp and W. J. Brewer	2062	19.52	Sep. 16
Home Rule	Similkameen	Vermilion Forks M. and D. Co	1294	51.65	Oct. 23
Highland Lass	Greenwood	J. T. Bell and G. A. Rendell	2341	27.10	〃 27
Highlander Fr	〃	J. T. Bell and J. P. Anderson	2344	20.61	〃 28
Humbolt	Similkameen	Wm. A. Cooper and A. J. Cooper	121	51.65	〃 28
Halifax	Grand Forks	Arthur Jordan	3042	33.70	〃 28
Hesperus Fr	〃	Chas. J. Magee	3057	27.64	Nov. 24
Hiram Walker	Osoyoos	Dominion, Fairview and Golden Klondyke Synd., Ltd	2065	25.02	〃 25
Hairspring	〃	Geo. A. Bemis and J. A. Greene	2056	45.68	〃 26
Hackla	Greenwood	N. E. Peterson and A. E. Ashcroft	2847	48.16	〃 28
Homestead Fr	Osoyoos	Jas. M. Sharp and W. J. Brewer	2061	37.16	〃 30
H. R.	Greenwood	Robt. J. Bayes and H. Reed	1033	50.72	Dec. 21
Iron Duke	Osoyoos	Myron K. Rodgers	1600	23.00	March 20
Iron King	〃	J. M. Sharp and W. J. Brewer	2060	16.68	Sep. 16
Iron Mask	Similkameen	Vermilion Forks M. and D. Co., Ltd	813	49.13	Oct. 23
Jefferson	Greenwood	Francis A. Doty	1997	51.65	July 21
Jubilee No. 2	Similkameen	Vermilion Forks M. and D. Co., Ltd	814	41.75	Oct. 23
Jennie Lind Fr	Grand Forks	Arthur Jordan	3043	20.00	〃 28
Jennie Silkman	Similkameen	David Day, L. G. Barrow *et al.*	810	22.66	Nov. 16
Jumbo	Kamloops	Wm. Buxton, R. Blair *et al*	1067	4.13	Dec. 14
Kentucky	〃	Alex. S. McCarter and J. M. Harper	835	32.81	April 21
Knob Hill	Greenwood	Sidney C. Cosens	2659	51.65	Sep. 9
Keystone	Grand Forks	Jas. N. Paton and C. Frank	2729	51.63	〃 12
Lucky Silverthorne	Similkameen	Mira Monte Mg. Co., Ltd	228	15.40	March 19
La Plaza [Fr.	Greenwood	Geo. F. Miller	1393	45.60	〃 27
Lone Star	Similkameen	S. R. Almond, J. Snowdon *et al*	1935	38.58	June 2
Le Roy	Greenwood	Enos H. Shaw and J. D. Graham	2565	51.65	Aug. 12
Lizzie	〃	〃 〃	2566	49.19	〃 12
Lillie May	〃	H. R. Davidson	1285	51.32	〃 13
La Reine	Similkameen	Vermilion Forks M. and D. Co., Ltd	233	44.96	Oct. 23
Lady of the Lake	Greenwood	No. 7 Mg. Co., Ltd	1642	51.36	〃 27
Lone Tree	Kamloops	Robt. H. Lee	883	51.41	Nov. 30
Myrtle	Greenwood	H. Megraw, A. Megraw *et al*	1654	47.30	Feb. 13
Muldoon	Yale	Mira Monte Mg. Co	227	32.00	March 19
Mogul	Greenwood	Chas. D. Temple	2857	48.55	〃 26
Monetor	〃	J. Peterson and O. Mellon	2858	46.68	〃 26
Mexico	〃	John C. Farr	2867	27.30	〃 27
Molka	Osoyoos	Jacob Rink *et al.*	2675	45.20	April 18
Midway	Grand Forks	Chris. J. Lundy	1399	41.34	May 8
Mascotte Fr	Lardeau	Ophir Lade Mg. Synd., Ltd	5418	13.44	〃 13
Myrtle	Greenwood	J. S. C. Fraser	1891	43.56	June 15
Mystic	〃	Hal J. Cole	2396	46.87	〃 25
Missing Link No. 2	〃	G. R. Naden and J. E. Leckie	1474	9.63	〃 25
Mayflower [Fr.	Grand Forks	C. Hay and N. McCallum	1619	35.31	Aug. 10
Moonlight	Greenwood	Spencer Benerman	1528	51.65	〃 12

YALE.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Mayflower	Greenwood	H. R. Davidson	1284	51.15	Aug. 13
Morning Star	〃	Sidney Rosenhaupt	2570	50.46	Nov. 19
Mountain	Kamloops	Cinnabar Mg. Co. of B. C	929	21.21	〃 28
Muldoon	Greenwood	Alex. Waddell and W. G. McMynn	2639	51.64	Dec. 18
Montana	〃	〃 〃	2640	50.62	〃 18
Novelty Fr	Grand Forks	B. C. Chartered Co., Ltd	949	6.90	March 24
No. 5	〃	Mary Garland	1878	22.40	May 8
Newport	Similkameen	Jno. E. Bate	1129	47.26	June 18
Noble 5	〃	R. J. Armstrong	1131	30.46	July 30
Napoleon Bonaparte	Grand Forks	Chas. Hay and N. McCallum	1614	43.76	Aug. 10
Napoleon	Greenwood	D. Smith, A. Smith *et al*	2346	23.90	〃 14
North End	〃	Jacob C. Haas and S. M. Johnson	1291	37.35	Sep. 10
Nickel Plate	〃	Pat A. Linberg, N. E. Peterson *et al*	2843	30.48	Oct. 2
New St. Maurice	Grand Forks	Harry Johnson, August Garnier *et al.*	682	48.60	〃 13
No. 15	Greenwood	Vancouver and Boundary Ck. Dev & Mg. Co.	2607	51.65	Nov. 20
No. 9	〃	〃 〃	2608	32.00	〃 20
Norfolk	Grand Forks	Alice J. Dunlop, R. J. E. Leckie *et al*	2734	51.65	〃 27
Oriole	Similkameen	S. R. Almond *et al*	808	29.84	June 18
Olalla	Osoyoos	J. M. Sharp and W. J. Brewer	2059	37.95	Sep. 16
Oro Bastante	〃	Geo. A. Bemis and J. A. Greene	2055	44.90	Nov. 26
Pinhook	Greenwood	G. R. Naden and J. E. Leckie	1469	32.75	Feb. 16
Portland	Similkameen	Portland Mg. Co., Ltd	1124	45.98	Aug. 3
Passayton	Kamloops	Smith Curtis and E. Brown	229	51.65	Nov. 30
Queen of the West.	Similkameen	Julia A. Hinshaw	1132	26.30	July 31
Quebec	〃	Portland Mg. Co., Ltd	1126	51.57	Aug. 3
Rob Roy	Greenwood	J. J. Warren	1556	51.65	Feb. 12
Rock Creek	〃	Ainsley Megraw	2527	41.21	〃 12
Rambler	〃	Chas. D. Temple	2861	51.65	March 26
Rose	Grand Forks	DeWitt C. Beach, J. S. C. Fraser *et al.*	1035	39.38	June 4
Red Mountain	Osoyoos	C. deB. Green, T. Cory *et al.*	2666	45.38	Oct. 27
Redwood Fr	Similkameen	Mira Monte Mg. Co	1103	31.40	June 18
Rohne Fr	Osoyoos	Jacob Rink *et al.*	2676	17.10	July 2
Rosie	Greenwood	A. M. Winston	1943	34.50	Aug. 14
Rearguard Fr	Osoyoos	W. J. Brewer	2700	47.16	〃 24
Spokane	Greenwood	Chas. E. Peterson	2796	43.70	Feb. 16
Syd. M. Johnson	〃	Geo. D. Leyson	1961	49.29	May 28
Shamrock	Grand Forks	DeWitt C. Beach, C. S. Wallis *et al*	1040	51.65	June 4
Spider Fr	Similkameen	S. R. Almond and Jas. Snowdon	811	25.93	〃 18
Surprise	Osoyoos	J. M. Sharp and W. J. Brewer	2058	37.48	Sep. 16
Slamet	Greenwood	Lytton W. Shatford, W. Edwards *et al.*	2663	38.12	Oct. 22
Silver Dollar	〃	Chas. Newman, J. Peterson *et al.*	2842	40.85	〃 22
Scranton Fract	〃	F, J. Finucane	1279	9.60	〃 28
Skyline	Similkameen	Star Exploration and Mg. Co	94	44.50	Nov. 12
Starlight	Greenwood	F. B. Holmes, A. B. Coutts *et al.*	1889	39.50	〃 14
Seven Thirty	〃	H. R. Davidson	1459	51.65	〃 19
Sunnyside	〃	Michael McBean	2879	43.85	Dec. 21
Tiger	〃	Wm. M. Law	2097	50.88	March 20
Thistle	Grand Forks	DeWitt C. Beach, C. S. Wallis *et al*	1041	50.57	June 4
Tam O' Shanter	Kettle River	C. R. Forde, Geo. Kidd *et al*	2405	39.77	〃 10
Trapper	Greenwood	H. R. Davidson and H. B. Thoen	1467	51.65	Aug. 14
Tacoma	〃	Annie Christinson and S. J. Jensen	1715	41.17	〃 15
Treasury Fr.	Grand Forks	Henry P. Jackson	1422	19.63	Sep. 23
Toronto No. 2	Osoyoos	Peter Scott	2668	18.50	Oct. 12
Terrier	〃	C. deB. Green and T. Cory	761	41.14	〃 27
Three Tramps	Vernon	H. Seydell, B. F. Young *et al.*	525	45.88	Dec. 23
Utopia	Kettle River	Chas. D. Temple	2860	44.00	March 26
Vicksburg	Similkameen	Portland Mg. Co., Ltd	1125	51.23	Aug. 3
Victoria	Greenwood	B. H. John and H. Cathcart	2523	51.65	Sep. 9

YALE.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Vancouver	Similkameen	Vermilion Forks M. and D. Co	1295	44.00	Oct. 23
Waterloo Consol Fr.	Greenwood	Waterloo Consol. M. and M. Co.	2814	21.34	Feb. 12
White Horse	〃	J. Graham, A. Hudson *et al.*	2610	30.99	April 8
Winedot	〃	E. H. Shaw and J. D. Graham	2567	36.19	Aug. 12
Warrior Fr	Osoyoos	W. J. Brewer	2749	43.52	〃 24
Young George	Greenwood	Andrea Poggi and F. J. Finucane	2942	51.65	June 1
Yukon Fr	〃	Nicholas Garland	1531	8.00	Dec. 22

COAST AND VANCOUVER ISLAND.

Alladin	Nanaimo	A. J. Milner and B. J. Tobin	189	51.65	March 20
Anoka	Victoria	Mt. Sicker and Brenton Mines, Ltd	16G	40.56	〃 25
Ax	〃	H. E. Newton	136	51.65	July 4
Ax Fract	〃	〃	144	34.36	〃 4
Alpha	Alberni	Laurence Manson	535	32.00	Aug. 29
Alps No. 2	N. Westm'r.	Jas. Douglas	1792	49.35	Nov. 27
Alps	〃	B. C. Standard Mining Co., Ltd	1786	51.65	Dec. 22
Black Prince	Nanaimo	M. R. Wells	318 R 1	42.08	Feb. 16
Bully Boy	〃	Queen Bee Gold Mining Co., Ltd	324A	19.11	April 2
Bald Eagle No. 2	Alberni	E. V. Bodwell	459	51.65	〃 3
B. C.	Nanaimo	Robt. Forbes	71	40.96	June 1
Blue Lead	N. Westm'r.	A. McDonald, P. Santine *et al*	2054	42.33	〃 10
Balkis	Alberni	Wm. Watkins	383	48.00	Aug. 20
Belvidere	〃	Laurence Manson	301	28.00	〃 29
Big Bear	〃	〃	304	40.18	〃 29
Black Prince	Victoria	A. Deakin, W. Lorimer *et al*	149	40.94	Oct. 28
Bessie	〃	Margaret W. Melrose and W. Vanstone	2G	51.65	Nov. 23
Copper Queen	Nanaimo	H. W. Treat and L. Goodacre	40 T I	48.64	Feb. 18
Copper Queen	Alberni	F. B. Pemberton	597	38.03	March 16
Cap Sheaf	Nanaimo	Cap Sheaf Copper and Gold Co., Ltd	180	47.00	〃 23
Crown Point No. 5.	Alberni	Homer H. Swaney	456	46.12	April 9
Cœur d'Alene	〃	Wm. Watkins	306	26.58	Aug. 20
〃 No. 1.	〃	〃	307	22.56	〃 20
〃 〃 2.	〃	〃	308	34.42	〃 20
〃 〃 4.	〃	〃	309	33.91	〃 20
〃 Fract.	〃	〃	310	5.91	〃 20
Condor	N. Westm'r.	Jas. Ironside	1793	51.65	Nov. 27
Donald	Victoria	Tyee Copper Co., Ltd	63G	44.15	Feb. 18
Daisy	N. Westm'r.	Goldsmith Cop. Co., Ltd	1899	48.55	April 2
Dunsmuir	Victoria	Mt. Sicker and B. C. Dev. Co., Ltd	56G	49.75	Aug. 21
Defender Fr	〃	〃 〃	74G	7.42	〃 21
Excelsior	Skeena	R. P. Rithet, J. Irving *et al.*	9 R 4	45.30	March 5
Em	Nanaimo	A. J. Milner and B. J. Toben	192	47.14	〃 20
Edna B	〃	Cap Sheaf Copper and Gold Mines Co	188	41.84	〃 23
Elmore Fr	Victoria	Mt. Sicker and Brenton Mines, Ltd	91G	4.38	〃 25
Empress of India	Alberni	Robt. A. Newton	155G	51.65	May 12
Fizz Fract	Victoria	C. J. Newton	148	12.90	Feb. 11
Fizz	〃	R. A. Newton	147	49.96	〃 11
Fisherman	Alberni	Laurence Manson	299	29.06	Aug. 29
Golconda	Nanaimo	J. H. Hoare	244 R 1	51.56	Feb. 12
General Warren	Victoria	H. E. Newton	138	32.81	April 22
Hazel Ruth	Nanaimo	Albert J. Milner and B. J. Toben	191	43.51	March 20
Iron Chief	Alberni	E. V. Bodwell	374	50.75	April 3
I. X. L	〃	R. T. Godman	156G	51.65	May 12

COAST AND VANCOUVER ISLAND.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Independence Fr	Victoria	Mt. Sicker and B. C. Dev. Co., Ltd	72G	25.20	Oct. 10
Ironclad	〃	Sarah L. Bevins	80G	51.20	〃 10
Iron Duke	Nanaimo	N. W. Dobeson	184	51.54	Nov. 27
Lucky Jack	〃	Annie E. Forbes	79	49.24	June 1
Lynx Fr	Victoria	Mt. Sicker and B. C. Dev. Co., Ltd	75G	17.35	Aug. 21
Lubbe	〃	Caroline A. Lubbe, Mary Phair *et al*	80	48.85	Sep. 23
Little Bantam Fr	〃	E. Calder, S. T. Chapman *et al*	95G	9.88	Nov. 23
Morning Star	Nanaimo	Percy Jas. Chick	343 R 1	26.77	Feb. 11
Manx Fr	Victoria	H. E. Newton	145	8.43	〃 11
Muriel Fr	〃	Tyee Copper Co., Ltd	108G	12.33	〃 18
Marmot	Alberni	F. B. Pemberton	599	14.70	March 16
Mountain Bear	〃	〃	600	29.45	〃 16
Maxie Fr	Nanaimo	Cap Sheaf Copper and Gold Co., Ltd	185	6.31	〃 23
May	Victoria	Mt. Sicker and Brenton Mines, Ltd	92G	32.15	〃 25
Milner	Nanaimo	Jas. Forbes, Sr	77	39.63	June 1
Minneapolis	〃	Robt. Forbes	78	38.29	Aug. 19
Mt. Skirt	Victoria	Caroline Lubbe, M. Phair *et al*	79	41.11	Sep, 23
Mona Fr	〃	Margaret M. Melrose and W. Vanstone	119G	14.68	Oct. 10
Mildred	〃	Ed. Calder and A. D. McKinnon	96G	45.17	Nov. 23
N. T. Fract	〃	Tyee Copper Co., Ltd	43G	2.97	May 9
Nelson	Nanaimo	Robt. Forbes	73	50.10	Aug. 19
Nero	〃	Maurice Gintzburger	328 R 1	21.56	Oct. 26
Old Ireland	Alberni	Wm. H. Flett	458	47.43	April 9
Orphan Boy	〃	Laurence Manson	298	27.44	Aug. 29
Ocean Wave	〃	〃	303	31.50	〃 29
Olivia	Nanaimo	N. W. Dobeson	179	46.10	Nov. 27
Phil Fract	Victoria	Tyee Copper Co., Ltd	110G	1.50	Feb. 18
Paystreak	Nanaimo	Robt. Forbes	75	51.65	Aug. 15
Pauper	Victoria	Henry Fry	31G	51.65	〃 21
Phair	〃	Caroline A. Lubbe, M. Phair *et al*	78	50.68	Sep. 23
Phair Fr	〃	〃 〃	5855	41.50	Oct. 23
Queen Bee	Nanaimo	Queen Bee Gold Mines, Ltd	345	49.11	April 2
Rose	N. Westm'r.	Geo. Wagg	1922	48.90	June 11
Ralph	Victoria	Caroline Lubbe, G. H. Burns *et al*	77	51.65	Sep. 23
Ralph Fr	〃	〃 〃	82	.73	〃 23
Sadie	Skeena	R. P. Rithet, J. Irving *et al*	8 R 4	42.09	March 5
Silver King	Alberni	F. B. Pemberton	596	29.20	〃 16
St. George	〃	〃	598	35.23	〃 16
Shamrock	Nanaimo	A. J. Milner and B. J. Toben	186	40.58	〃 20
Soverine	〃	Cap Sheaf Copper and Gold Co	183	47.74	〃 23
Star	Victoria	Mt. Sicker and Brenton Mines, Ltd	93G	42.78	〃 25
Standard No. 6	Alberni	J. W. Ladd	392	47.57	April 9
Storneway	Nanaimo	Annie E. Forbes	72	48.42	June 1
Seattle	Victoria	Mt. Sicker and B. C. Dev. Co., Ltd	57G	30.76	Aug. 21
Santa Cruse	Alberni	L. Manson	302	33.85	〃 29
Southern Cross	〃	〃	305	49.40	〃 29
Toby	Victoria	Tyee Copper Co., Ltd	18G	49.00	Feb. 18
Tax	〃	R. A. Newton	137	51.16	March 24
Two Dear	〃	H. Fry and J. S. Bevins	32G	49.30	May 11
Tortilla	Alberni	L. Manson	536	20.50	Aug. 29
Tolmie	Victoria	C. A. Lubbe, M. Phair *et al*	86	48.65	Sep. 23
Victoria	N. Westm'r.	Harry Freeman	1727	30.75	March 24
Victoria	Alberni	W. H. Flett	457	49.90	April 9
Vanderbilt	Nanaimo	Jas. Forbes, Sr	76	51.65	June 1
Vulture	N. Westm'r.	W. J. Kerfoot	1794	51.60	Nov. 27
Wax	Victoria	C. J. Newton	130	51.00	Feb. 11
X Ray	Nanaimo	A. J. Milner and B. J. Toben	187	46.00	March 20
Yankee	Victoria	Mt. Sicker and Brenton Mines	89G	51.65	〃 25

GOLD COMMISSIONERS AND MINING RECORDERS.

Mining Districts and Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Cassiar District	Telegraph Creek	James Porter		
Stikine	〃		James Porter	
Liard	〃		〃	
Teslin Lake	〃		〃	
Sub-office	Atlin			E. J. Thain.
Atlin District	Atlin	J. A. Fraser		
Atlin Lake	〃		E. J. Thain	
Sub-office	Wells			J. J. McKenna.
Skeena District	Victoria	W. S. Gore		
Skeena River	Port Simpson		John Flewin	
Sub-office	Masset			C. Harrison.
〃	Kitsilas			S. A. Singlehurst.
〃	Kitimat			Jas. Steele.
〃	Essington			Chas. Berryman.
〃	Skidegate, Q. C. I.			W. H. Dempster.
〃	Bear River			John Conway.
〃	Hazelton			John Kirby.
〃	Lorne Creek			F. E. Holt.
Bella Coola	Victoria		W. S. Gore	
Omineca District	Manson Creek	F. W. Valleau		
Omineca	〃		F. W. Valleau	
Sub-office	Tom Creek			Vacant.
〃	Fort St. John			F. W. Beatton.
〃	Fort St. James			Alex. C. Murray.
Cariboo District	Barkerville	John Bowron		
Cariboo	〃		John McKen	
Quesnel	Quesnel Forks		W. Stephenson	
Lillooet District				
Clinton	Clinton	F. Soues	F. Soues	
Lillooet	Lillooet	C. Phair	C. Phair	
Kamloops District	Kamloops	G. C. Tunstall		
Kamloops	〃		E. T. W. Pearse	
Sub-office	Nicola			Geo. Murray.
Ashcroft	Ashcroft		J. W. Burr	
Similkameen	Princeton		H. Hunter	
Sub-office	Nicola			Geo. Murray.
〃	Hedley			F. M. Gillespie.
Yale	Yale		Wm. Dodd	
Vernon District	Vernon	L. Norris		
Vernon	〃		H. F. Wilmot	
Boundary District				
Greenwood	Greenwood	W. G. McMynn	Geo. Cunningham	
Sub-office	Vernon			H. F. Wilmot.
〃	Camp McKinney			H. Nicholson.
〃	Beaverdell			A. Megraw.
Grand Forks	Grand Forks	S. R. Almond	S. R. Almond	
Osoyoos	Fairview	C. A. R. Lambly	J. R. Brown	
Sub-office	Olalla			J. T. Armstrong.
〃	Hedley			F. M. Gillespie.
Golden District	Golden	J. E. Griffith		
Golden	〃		F. C. Lang	C. E. Hamilton.
Windermere	Windermere		John Bulman	

Mining Districts and Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Fort Steele District	Fort Steele	J. F. Armstrong		
Fort Steele	〃		Jas. Hislop	
Sub-office	Tobacco Plains			M. Phillipps.
〃	Fernie			L. Forbes.
〃	Cranbrook			F. R. Morris.
〃	Kimberley			S. Hoskins.
〃	Moyie			F. D. Hope.
Revelstoke District	Revelstoke	Fred Fraser		
Revelstoke	〃		W. E. McLauchlin.	
Illecillewaet	〃		〃	
Lardeau	Camborne		G. Sumner	
Trout Lake	Trout Lake		F. C. Campbell	
Sub-office	Poplar Creek			J. Simpson.
Slocan District	Kaslo	E. E. Chipman		
Slocan	New Denver		Angus McInnes	
Sub-office	Sandon			E. M. Sandilands.
Slocan City	Slocan City		H. P. Christie	
Ainsworth	Kaslo		A. Lucas	
Sub-office	〃			C. C. Daley.
〃	Howser			W. Simpson.
〃	Poplar Creek			J. Simpson.
Nelson District	Nelson	R. Renwick		
Nelson	〃		C. D. Blackwood	
Sub-office	Ymir			P. J. Gleazer.
〃	Creston			J. Wilson.
Arrow Lake	Nakusp		W. Scott	
Sub-office	Vernon			H. F. Wilmot.
Rossland District	Rossland	John Kirkup		
Trail Creek	〃		J. A. Hooson	
Nanaimo District	Nanaimo	Marshal Bray		
Nanaimo	〃		Marshal Bray	
Sub-office	Alert Bay			W. Woollacott.
Alberni District	Alberni	A. L. Smith		
Alberni	〃		A. L. Smith	
Clayoquot	Clayoquot		W. T. Dawley	
Quatsino	Yreka		B. W. Leeson	
Victoria District	Victoria	W. S. Gore		
Victoria	〃		G. V. Cuppage	
New Westminster	New Westminster.		D. Robson	
Sub-office	Harrison Lake			L. A. Agassiz.
〃	Vancouver			R. J. Skinner.
〃	Chilliwhack			J. Pelly.

DECISIONS

Of the Geographic Board of Canada, relating to Geographic Names in British Columbia.

By Order in Council dated December 18th, 1897, the Governor-General in Council was pleased to create a "Geographic Board," and was further "pleased to order and direct that all questions concerning geographic names in the Dominion which arise in the departments of the public service shall be referred to the Board, and that all departments shall use in their publications the names and orthography adopted by the Board."

At the request of the Dominion Government that the Provincial Government appoint a representative on the "Geographic Board," the Lieutenant-Governor in Council was pleased to appoint Wm. F. Robertson, Provincial Mineralogist, a member of the Board, representing British Columbia. The Fourth Report of the Board, containing a large number of rulings relating to British Columbia names, may be obtained from the Provincial Mineralogist, Victoria, and a General Report will be shortly issued.

APPENDIX.

PETROGRAPHY OF ROCK SAMPLES FROM BRITISH COLUMBIA.

The following samples were collected in the field by the Provincial Mineralogist and others, and the microscopical examinations were made by the kindness of the gentlemen whose names are mentioned. The running numbers (in black figures) are for reference; the other numbers refer to the duplicate samples retained in the Provincial Mineral Museum, Victoria:

TEXADA AND VANCOUVER ISLANDS.

Samples examined by Dr. Barlow (Petrographer to the Geological Survey).

1. 5052.—*Cornell Mine, Texada Island.*—Felsite near shaft, second level. The ore-bearing matrix. The hand specimen shows a fine-grained crystalline rock of greenish grey colour and earthy lustre. Under the microscope the rock has a distinctly porphyritic structure, and from the mineral content is an augite porphyrite. Finely twinned plagioclase, and colourless augite comprise the phenocrysts. The former occurs in lath-shaped and tabular form, while the latter is rather irregular. The base is in great part composed of augite, with which is associated turbid granular aggregates of epidote and calcite in the interstitial spaces. Pale brown garnet (almanditic) and colourless apatite are present as accessory constituents.

2. 5052.—As above.

3. 5053.—As above.

4. 5053-4.—More decomposed variety of 5052.

5. 5054-5.—*Cornell Mine, Texada Island.*—Ore-bearing matrix. The rock is a pale green granular pyroxenite, holding a large amount of accessory almandine garnet. Microscopically it consists principally of polygonal and rounded idiomorphic individuals of pyroxene. Saussuritized plagioclase and a pale brown garnet occupy angular spaces between the pyroxene individuals. The garnet shows well-defined optical anomalies. This rock, from its association, is a deep-seated basic phase—possibly a seggregation of the augite porphyrite.

6. 5057-8.—*Cornell Mine, Texada Island.*—Diabase porphyrite from 2nd level. The rock is fine-grained, greenish in colour, and has a somewhat sheared appearance. Under the microscope it is seen to be a much decomposed diabase porphyrite, and is evidently a deeper seated portion of the magma. The plagioclase is probably near the basic end of the series. Its well developed zonal structure shows a different composition for the interior and periphery, of which the former is the more basic and much saussuritized. The pyroxene has wholly altered to a pale green pliochroic actinolite, with a separation of turbid epidote and a little calcite. Some irregular aggregates of brown biotite, numerous grains of magnetite and a few of apatite complete the section.

7. 5060-11.—*Cornell Mine, Texada Island.*—Ore-bearing matrix; 3rd level. The non-metallic minerals composing the bornite matrix are pale green pyroxene and brown garnet. The microscopic section shows that the matrix is principally garnet—similar to that described in 5054—with a subordinate amount of colourless augite. The garnet is much cracked, and these cracks are filled with the sulphides, chalcopyrite and bornite, and these are connected with the larger grains.

8. 5058-9.—*From near Iron Mine, Texada Island.*—Augite porphyrite: (*See* Report 1902, pages 225 *et seq.*) The hand specimen represents a basic and much decomposed porphyritic rock. Under the microscope this rock is seen to be an augite porphyrite. The plagioclase feldspar occurs in stout, lath-shaped individuals, with irregular borders. It is very turbid, both from alteration products and inclusions, the former being principally zoisite. The augite has wholly altered to a pale green pliochroic actinolite, which preserves the form and twinning of the original mineral. Aggregates of pale brown biotite and grains of magnetite are associated with the actinolite, in part as inclusions. Secondary quartz occurs in the base as grains interlocking with the feldspar.

9. 5055-6.—*Iron Mine* (*Lee's Camp*), *Texada.*—Augite porphyrite occurring beneath the magnetite. Macroscopically the rock is a fine-grained porphyrite with a greenish base, which holds small stringers of iron pyrites. Microscopically the rock is composed of phenocrysts of colourless augite and brown pliochroic hornblende, imbedded in a turbid base consisting of a fine-grained aggregate of feldspar, augite, epidote and calcite. Both the augite and hornblende are altering to a fibrous and platy pale green chlorite. A few yellowish spheres occur as inclusions in the augite. The rock is a decomposed augite porphyrite.

10. 5056-8.—*Iron Mine* (*Lee's Camp*), *Texada Island.*—Dyke rock (diabase) on one side of rich copper lead. The hand specimen represents a medium-grained rock which shows on the weathered surface the structure of a diabase. The microscope shows the rock to be quite fresh and a typical diabase. The plagioclase occurs in lath-shaped individuals twinned according to the albite law, with a few showing additional periclin twinning. A pale yellow augite and brown biotite occupy interstitial spaces between the feldspars. The biotite holds rounded grains of augite and feldspar in a poihilitic manner. Magnetite is very abundant and is associated with the augite.

11. 5059-10.—*Iron Mine, Texada Island.*—Granitic rock. Quartz-augite-syenite. This rock is a highly feldspathic one, fine in grain and light coloured. Under the microscope the rock is seen to have a typical hypidiomorphic structure and to consist principally of feldspar with subordinate amounts of quartz and augite. The feldspar is of two generations, a plagioclase—albite or oligoclase—with rather good form, and orthoclase with poor form and irregular interlocking borders. The augite is pale yellow, and is considerably altered to actinolite and epidote. The quartz is hardly in sufficient amount to be essential, therefore the rock is a quartz-augite-syenite.

12. 5645.—*Esquimalt, V. I.*—Basic eruptive porphyrite. The hand specimen is a dark green, dull rock traversed by planes presenting chloritised and slickensided surfaces. The thin section consists of saussuritized phenocrysts of feldspar in a base of granular and fibrous chlorite and actinolite. Quartz and feldspar-actinolite veins traverse the rock. Iron ore and epidote are also present.

QUATSINO SOUND, V. I.

Samples examined by J. A. Dresser.

13. 1.—*Paystreak Claim, Quatsino.*—Country rock (altered quartzless porphyry) from *Paystreak* claim, situated three-quarters of a mile up Teta river, on the west side of South-East arm, Quatsino sound, four miles from head of arm. Altitude of tunnel from which rock was taken, 125 feet. This is a light grey rock showing a finely porphyritic structure. It weathers to a rusty brown, and has a hardness of 6, or more. By the aid of the microscope this rock is seen to be clearly of igneous origin. It consists of a finely crystalline groundmass containing phenocrysts of feldspar. Both phenocrysts and groundmass are generally quite turbid by alteration to kaolin and muscovite. One of the phenocrysts shows extinction parallel to a

principal axis, and hence is orthoclase, while another still displays lines of twinning according to the albite law, and so is plagioclase. The angles of extinction indicate that its original composition was about that of oligoclase. Orthoclase, however, seems more abundant. Bisilicates and other dark minerals are conspicuously absent. A little quartz is seen, but is evidently a secondary constituent. The rock is, therefore, an altered quartzless porphyry.

14. 2.—*White Quartz Claim, Quatsino.*—Country rock (altered granite porphyry), from *White Quartz* claim, about quarter of a mile south of *Paystreak* claim, one mile from salt water; altitude, 1,050 feet. A light grey rock with rusty weathering. It is holocrystalline, but has a rather fine texture. By the aid of a lens, specks of pyrite can be seen. In the microscopic section it is found to be an eruptive rock considerably altered by decomposition. Quartz and feldspar are present in distinct phenocrysts, and also in granophyric intergrowths of the two minerals. They doubtless, too, originally composed certain areas, now turbid from incipient alteration, of a microcrystalline ground mass. Frequent patches of epidote and other secondary constituents are results of the decomposition, now pretty complete, of primary ferromagnesian minerals. Grains of iron are numerous, some of which are primary. The latter are frequently altered in some degree to leucoxene, and hence are either ilmenite, or titaniferous magnetite. The rock is an altered granite porphyry.

15. 3.—*Iron Claims, Quatsino.*—Country rock (felsite) near deposits of bog iron on the north side of the West arm of Quatsino sound, 9 miles west of Coal harbour. This is a grey rock which shows no structure to the unaided eye. It contains numerous grains of pyrite. The specimen is a much decomposed one. By the aid of the microscope it is found to be volcanic and holocrystalline. The greater part of the slide is made up of a fine aggregate of quartz and feldspar. There are also larger grains of feldspar, which are rendered turbid in appearance by decomposition. It is probable that these originally crystallised as small phenocrysts in a glassy or cryptocrystalline base, which by devitrification has assumed its present microcrystalline condition. It carries a considerable amount of pyrite, as well as a little titaniferous magnetite, or ilmenite. The rock is correctly labelled "felsite," according to the general use of that term, and from the material at hand it cannot be more precisely defined.

16. 4.—*Yreka Mine, Quatsino.*—Country rock (porphyry) in upper drift, *Yreka* mine. This is a very light grey rock, uniform in colour, and extremely hard. It is seen to have a porphyritic structure, the phenocrysts being distinguishable only by their lustre. Under the microscope it is seen to be a volcanic rock, holocrystalline and porphyritic. The phenocrysts are all feldspar, the greater number being orthoclase. The plagioclase shows the characters oligoclase. The ground mass is microcrystalline in texture, and shows a little quartz along with the feldspar, of which it is largely composed. A light-coloured augite is present in considerable amount. As the amount of quartz is very small, the rock is best classed as a quartz-free porphyry, although in some measure intermediate between that class and quartz-porphyry.

17. 5.—*White Quartz Claim, Quatsino.*—Dyke rock (diabase) in tunnel of *White Quartz* claim. A rock of medium grey colour, crystalline structure, and fine, even texture. In the microscopic section it is found to be composed of plagioclase feldspar in lath-shaped crystals, a much docomposed pyroxene, which occupies the interstices amongst the feldspars, and a smaller amount of quartz, which also occur interstitially. Magnetite occurs as an accessory constituent. The decomposition of the pyroxene has produced large amounts of rhombohedral carbonate, either calcite or clolomite. The structure of the rock is ophitic, the pyroxene having crystallised either contemporaneously with or later than the feldspar. The rock is a typical diabase. It is without olivine, and is nearly quartz-free.

18. 6.—*June Group, Quatsino.*—Country rock (porphyritic hornblende granite), from face of quarry, *June Group;* ore occurs amongst this rock. The *June Group* of claims lies about six miles east from the centre of the South-East arm of Quatsino sound. In the hand specimen this rock presents the appearance of fine-grained granite, carrying noticeable amounts of pyrites. It is somewhat laminated, evidently due to the foliation of the rock. This is further shown in the microscopic section, where certain larger crystals show strain shadows, caused by the deformation of the rock subsequently to its solidification. The rock consists chiefly of fine grains of feldspar, quartz and chlorite, the latter representing primary hornblende, and it also contains larger crystals of orthoclase, plagioclase and quartz. Some of these are fractured, the cracks thus formed being filled with pyrites, which, consequently, is of later origin than the enclosing rock, having come into its present position after the foliation of the rock had begun. Pyrite and pyrrhotite thus occur. The rock is a porphyritic hornblende granite.

19. 7.—*Edison Claim, Quatsino.*—Rock (felsite) close to mineral contact on *Edison* claim, a quarter of a mile west of the Yreka mine, but higher up; altitude, 2,275 feet. To the unaided eye this is a fine-grained structureless rock of ash grey colour and having a rusty weathering. In the thin section it is seen to be an altered eruptive. In a few parts of the section laths of plagioclase are distinctly seen, but the greater part of the slide shows only a mass of secondary minerals, chiefly epidote, spotted by colourless areas of lower index of refractions largely made up of kaolinized feldspar. The latter probably represent phenocrysts in the original rock, the former an extremely altered groundmass. The metamorphism of the rock is so far advanced that it can scarcely be classed more definitely than as an altered volcanic. Its label indicates that it is a supposed felsite. This would be a correct determination from the present data, except that its chemical composition was evidently rather more basic than would mark a felsite. It was probably nearer to andesite in its original character.

20. 8A—*Yreka Mine, Quatsino.*—Country rock below a strata of garnetite carrying ore in *Yreka* mine. The hand specimens of this rock are only a few fragments, too small to afford reliable evidence of its general character. They are of a light grey colour and are fine-grained. By the aid of a lens, narrow veins, not exceeding .02 of an inch in width, are seen. They are distinguishable chiefly by their pearly lustre. In the microscopic section the rock is found to be so extremely metamorphosed that no primary minerals can be certainly detected in it. It is chiefly composed of epidote and patches of an indeterminable grey base. The veins referred to are found, under a high magnifying power, to be composed of a fibrous mineral, having rather high polarisation colours, and which extinguish with their longer axes parallel to the plane of the polariser. They are arranged with their longer axes sometimes parallel with, and at others transverse to, the sides of the veinlets in which they occur. It is apparently bastite or an allied mineral. The rock was originally a fine-grained basic eruptive. Its highly altered condition and the meagreness of the specimens make it impossible to determine it more precisely.

21. 8B.—*Yreka Mine, Quatsino.*—Country rock below a strata of garnetite carrying ore in *Yreka* mine. This is a greenish grey rock, massive, even-grained and of medium texture. A few grains of a grey mineral having a metallic lustre are seen, but are too small to admit of determination. They do not appear in the microscopic section. By the aid of the microscope this rock, like 8A, is found to be a highly altered basic eruptive, in which few, if any, of the original constituents remain. Epidote, calcite, pyroxene and a little feldspar can be discerned in it. It is a much altered basic eruptive, probably allied to 8A, to which it is essentially similar.

22. 9A.—*Yreka Mine, Quatsino.*—The general country rock (pyroxenic), in which the ore chutes occur in the *Yreka* mine. The *Yreka* is situated on the west side of the south-east arm of Quatsino sound, half-way from entrance to the head. Altitude from which samples were taken, about 1,050 feet. In the hand specimen this rock is quite similar to No. 8B. Under the microscope, too, it is found to agree essentially with Nos. 8A and 8B. Epidote and pyroxene minerals, with occasional grains of feldspar, comprise the rock. It is highly altered rock, probably of the pyroxenite class.

23. 9B.—*Yreka Mine, Quatsino.*—The general country rock (pyroxenic) in which the ore chutes occur in the *Yreka* mine. Altitude from which samples were taken, about 1,050 feet. This rock is greyish-green in colour, massive, and of medium texture. By the aid of the microscope it is seen to be an altered igneous rock, related to the last three described above. Pyroxene is the most abundant mineral; feldspar is present in subordinate amount, and a part of it can be seen to be plagioclase. A little brown hornblende also occurs, as well as a very small amount of quartz. It could not be satisfactorily ascertained whether or not the latter is a primary constituent. A few grains of magnetite are also seen. The rock is noticeably similar to certain acid phases of some of the pyroxenic rocks from the asbestos localities of the Province of Quebec.

24. 10A.—*Link Creek, near Quatsino Sound.*—This sample was taken from the rock in place in the bed of Link creek, between Alice and Victoria lakes, a short distance from the *June Group* in a south-east direction. The samples represent the general country rock (hornblende granite) of this district. This is a grey crystalline rock, showing a fine and, to the unaided eye, an even texture. In the thin section, however, it is found to have a somewhat porphyritic structure. The groundmass is a fine hornblende granite, consisting of feldspar, quartz and chlorite, the latter being evidently secondary after hornblende. Within this granite groundmass, which in places becomes altogether microcrystalline, there are numerous larger crystals of feldspar, chiefly orthoclase. A single grain of pyroxene was observed. Grains of pyrite and leucoxene, the latter representing original titianic iron ore, are also quite abundant. The rock is a hypabyssal type of hornblende granite.

25. 10B.—*Link Creek, near Quatsino Sound.*—This sample was taken from rock in place in the bed of Link creek, between Alice and Victoria lakes, a short distance from the *June Group* in a south-east direction. The sample represents the general country rock (hornblende granite) of this district. In the hand specimen this rock is essentially similar to the last. It may be slightly coarser in texture, but the specimens of both are rather small to admit of accurate comparison. By the aid of the microscope it is found to consist essentially of feldspar, which is largely orthoclasc, hornblende, generally reduced to chlorite, quartz and pyroxene. There is considerable pyrite present as an accessory constituent. This rock is a hornblende granite, having a tendency towards porphyritic structure. It is clearly related to 10A.

WEST COAST OF VANCOUVER ISLAND.

Samples examined by Dr. Barlow.

26. 5000A.—*Copper Island, Barkley Sound.*—Country rock (dacite), *Tunnel Mountain* claim. The hand specimen represents a finely crystalline, light grey, porphyritic rock, with dull lustre and irregular fracture. Microscopically it consists of phenocrysts of turbid plagioclase and quartz—the latter much corroded—in a very finely crystalline base which, partly granular, partly fibrous in structure, is made up of feldspar quartz and a mineral of the zeolite family. The ferro-magnesian constituent, originally augite, from the form, has altered to a pale yellow epidote which is rather turbid. The rock is a dacite.

27. 5001B.—*Magnetic Creek, Maggie Lake, West Coast V. I.*—Country rock (andesite tuff). The rock is light grey in colour, tufaceous in character and apparently much decomposed. Under the microscope it is seen to be composed of lath-shaped plagioclase individuals, very turbid from alteration. The ferro-magnesian is now represented by chlorite, epidote and calcite. The matrix is largely feldspathic and, in addition to holding the above secondary minerals, also holds quartz. Pyrite in grains and crystals occurs in considerable amount. The rock is a decomposed andesite tuff.

SKEENA MINING DIVISION.

Sample examined by Dr. Barlow.

28. 5039.—*Bonanza, Observatory Inlet.*—Andesite. The hand specimen represents a hard compact rock of a light grey colour and porphyritic structure. Under the microscope the rock is seen to consist of phenocrysts of feldspar and biotite imbedded in a microcrystalline quartz-feldspar-calcite groundmass. The feldspar is a plagioclase, probably oligoclase. It is very turbid from alteration to kaolin, epidote and calcite, the former product largely predominating. The form, as a rule, is good, but varies from idiomorphic to very irregular and corroded ones. The biotite is present in relatively small amount, and occurs in irregular individuals and oblong forms. It is much altered, either to chlorite or, by bleaching, to a green and then colourless mica, which still retains the high double refraction. A few grains and cubes of pyrite, a grain or two of zinc and apatite complete the section. The rock is an andesite and somewhat altered.

QUEEN CHARLOTTE ISLANDS.

Sample examined by Dr. Barlow.

29. 5040.—*Queen Charlotte Islands.*—Andesite tuff. The rock is greenish grey, soft, and of tufaceous appearance. Microscopically it is composed of fragments of volcanic rock, and phenocrysts and grains of plagioclase and quartz, the whole imbedded in a cryptocrystalline base which is yellowish from the infiltration of limonite. The rock fragments vary from angular to rounded; they are composed of tabular and slender lath-shaped plagioclase, finely twinned and imbedded in a green, greenish grey, or brown ground mass, which is chlorite, glass or cryptocrystalline mineral. These fragments may range from trachyte to basalt, but probably the majority are andesite. Some fragments are devoid of phenocrysts and simply consist of devitrified glass. The rock is a volcanic tuff, probably an andesite tuff.

KAMLOOPS DISTRICT.

Samples examined by Dr. Barlow.

30. 5662.—*Iron Mask Mine.*—Country rock, gabbro-porphyrite. A dark, medium-grained granitoid rock, which under the microscope is seen to consist of saussuritized feldspar, and more or less altered colourless augite. The alteration is such that a large amount of secondary mineral is developed, epidote, calcite, chlorite, kaolin and magnetite.

31. 5664 (3).—*Iron Mask Mine.*—Foot-wall, hornblende-porphyrite. The hand specimen is a fine-grained, dull, greenish grey rock with irregular fracture. Under the microscope the structure is seen to be porphyritic, the phenocrysts being turbid feldspar and a ferro-magnesian constituent—not wholly altered to chlorite, calcite and magnetite—which was originally hornblende. The matrix consists of lath-shaped feldspars associated with interstitial quartz, which is evidently secondary. The rock is possibly a contact facies of 5662.

32. 5663 (2).—*Iron Mask Mine.*—Vein matter in which high-grade copper occurs. The rock is porphyritic and is made up of dark phenocrysts, imbedded in a light green base which is very soft and crumbles at touch. The thin section shows a wholly altered rock, which in all probability was originally an augite porphyrite.

33. 5665 (4).—*Iron Mask Mine.*—Rock lying against back of foot-wall; olivine basalt. The hand specimen is a dark green and dull porphyritic rock with slickensided planes, along which are developed serpentine with oily lustre. The thin section consists of phenocrysts and rounded individuals of olivine in a base of chlorite, calcite, magnetite and epidote. The olivine is almost wholly altered to serpentine and granules of iron ore.

CARIBOO.

34. 5062-13.—*Mogul Mineral Claim, Mussel Creek, Horsefly Camp, Cariboo* (augite andesite tuff).

"This claim, located on August 27th, 1902, by Alonzo Lucas, is situated on Mussel creek, about four miles from its junction with Horsefly river. The creek here runs over a series of beds of basalt, lava and volcanic tuff, which appear to have a flow to the south-east and are cut by the stream with the formation of a couple of small falls. Imbedded in the lava were found small globules of copper, of a size from a pin's head up to almost two inches in diameter, while in some of the softer beds were seen small flakes of copper glance. Naturally, at this date, no work had been done, and the only exposures were in the creek bed. While a number of copper globules could be seen, the amount of metal visible was not economically important; yet it points to the fact that grains of metallic copper, at least, are contained in these lavas, so that the question naturally arises, do these same rocks contain globules of gold, and have they anything to do with the gold deposits of the district? These rocks, and the occurrence of copper in them, bear a marked resemblance to the copper-bearing volcanic tuff beds found near Aspen Grove, south of Nicola." (Minister of Mines' Report, 1902, p. H 71.)

The rock is a purplish-coloured tufaceous one and is much altered. It includes irregular areas of epidote and stringers of native copper. Under the microscope the rock is seen to be composed of turbid, lath-shaped plagioclase and a pale yellow augite in a base partly cryptocrystalline, partly opaque, the latter being caused by the presence of a large amount of reddish-brown hematite. Pliochroic epidote of radiate fibrous and columnar structure occupies irregular areas. Considerable magnetite is present in the matrix and also a few isolated grains of native copper. The rock is a decomposed augite andesite tuff.

BOUNDARY AND SIMILKAMEEN DISTRICTS.

Samples examined by L. P. Silver, B. Sc.

35. 117.—*Big Dutchman Mine, Aspen Grove Camp.*—Altered andesite.

"A rock which has the appearance of being a volcanic agglomerate or breccia containing considerable lime." (Minister of Mines' Report, 1901, p. 1180.)

Hand specimen is a fine-grained, greyish rock, showing a few stains of green carbonate of copper on the joint planes. Under the microscope, the rock is seen to be composed of a fine-grained groundmass of plagioclase felsdpar, in which are imbedded large porphyritic crystals of feldspar twinned according to Albite and Carlsbad laws, some untwinned individuals and some microperthitic intergrowths of albite and orthoclase. There are also some forms which are now entirely filled with magnetite and chlorite, but which, from the shape, once belonged to some ferromagnesian constituent, in all probability hornblende. There are areas in the section which consist of angular and sub-angular fragments, giving to it a brecciated appearance and which once evidently belonged to some closely related volcanic rock caught up by this one while it was in a molten condition. The rock is an altored andesite, which in some parts of the mass probably passes into an andesitic tuff or breccia.

36. 120.—*Big Sioux Mine, Aspen Grove.* Basalt.

"The country rock appears to have been of igneous origin and is somewhat similar to that of the rest of the camp; but at this point it has been considerably altered and now approaches serpentine." (Minister of Mines' Report, 1901, p. 1181.)

The hand specimen shows a massive, fine-grained, greenish-coloured rock, having green carbonate of copper stains in the cracks and on the weathered surfaces. Under the microscope, the rock is seen to be very much altered and to consist of a groundmass and phenocrysts. The former makes up a very small proportion of the rock and consists of small plagioclase crystals. The phenocrysts consist of feldspar, in large laths, showing twinning according to both the Albite and Carlsbad laws, some individuals having these two combined, thus allowing of the determination of their composition by Michel Lévy's admirable method. By this it was found such individuals consisted of an oligoclase with the composition $Ab_3 An_1$. There are also aggregates of epidote and chlorite, frequently having definite outlines, which give them the appearance of being secondary after augite. Calcite is also present as a secondary mineral; and, as accessory constituents, ilmenite, leucoxene and sphene are found in considerable quantities.

On account of the very considerable quantity of augite which was present in the original rock, as well as on account of the large proportion of iron ore present, the rock possesses a distinctly basic character, and consequently is better classed as a basalt than as an augite andesite.

37. 125.—*Medal Mineral Claim, Aspen Grove.*—"It is an extension of a dyke of from 10 feet to 12 feet wide, of lighter colour than the general rock, inclined to be porphyritic in structure and containing much lime; there is an impregnation of copper sulphide, but not of important quantity." (Minister of Mines' Report, 1901, page 1182.)

The hand specimen shows fine-grained reddish-looking rock containing greenish chlorite aggregates and a little chalcopyrite. Under the microscope, it is seen to be of volcanic origin, being composed of idiomorphic plagioclase containing zonally arranged alteration products and some individuals of pale green augite. The rock in some places shows a brecciated structure, the phenocrysts having broken outlines, while elsewhere may be seen aggregates of epidote individuals, apparently representing inclusions of some highly altered foreign rock. There are also certain forms now outlined in hydrated oxide of iron and filled with decomposition products, highly suggestive of the former presence of olivine. Biotite is noticeable, but is in nearly all cases wholly or partially altered to chlorite.

Native copper is present in the slides and, from its appearance, seems to be of secondary origin. It borders the plagioclase crystals in narrow strings and also occurs in bunches, running off in little strings which pass through the cracks. It sometimes occurs filling spaces which were once occupied by olivine. The rock was probably a basalt.

The occurrence of native copper is interesting, and its secondary nature is very plainly shown. It has no doubt been derived from the chalcopyrite by reduction.

38. 138.—*Maggie Mineral Claim,* lying to the west of the *Big Sioux.* Altered basalt. (Minister of Mines' Report, 1901, page 1182.)

Hand specimen is a fine-grained greenish rock, impregnated with pyrite and chalcopyrite. Under the microscope, the rock is seen to be much altered and to present a distinct porphyritic character, the phenocrysts being relatively more abundant than the groundmass, which is composed mainly of feldspar laths. Of the phenocrysts, the feldspar is the most abundant, some having good idiomorphic forms, while others show broken individuals. Augite is also abundant in medium-sized grains, which, however, have undergone considerable alteration, in some places being completely changed to epidote and chlorite. Calcite is abundant as an alteration product, and magnetite as an accessory constituent. The rock bears a distinct resemblance to No. 36 (120), but is relatively richer in feldspar and may be considered to be a highly altered basalt.

39. 13.—Fine-grained dark igneous rock (augite-andesite), with markedly porphyritic structure. From an exposure on Nevertouch creek, near its junction with Kettle river. (Minister of Mines' Report for 1901, page 1134.)

Under the microscope, the rock is seen to consist of a rather fine-grained groundmass, in which are imbedded well-defined phenocrysts which, like the groundmass, consist of plagioclase and augite. Many of the smaller feldspar grains are untwinned, and all have undergone considerable alteration. Augite is quite abundant in almost colourless grains, showing much alteration to chlorite. It has a maximum extinction of 39°, which, with its other characteristics, determines it to be diopside. A few crystals which, from their general appearance and high double refraction, closely resemble olivine, are also present. Some biotite occurs in the slides, but is very much altered, now consisting largely of chlorite. A small amount of epidote is present as an alteration product, and ilmenite, which occurs associated with sphene, is abundant as an accessory constituent. The rock is an augite andesite, or possibly, as suggested by the structure, some dyke rock of similar composition.

40. 14.—From the Gorge at the mouth of Canyon creek, where it enters Kettle river. (Minister of Mines' Report for 1901, page 1135.)

"The rock formation on either side of the gorge is of igneous origin, a fine-grained dark diabasic rock, inclined in places to be porphyritic in structure, and very similar to the rocks noted further north and near the heads of those creeks flowing in from the west. This rock apparently overlies the granite from this point as far as to the valley of the main river." (Minister of Mines' Report for 1901, page 1135.)

The collection contains two specimens from this locality, representing two different varieties of the same rock, one showing a massive and porphyritic character, while the other is scoriaceous. Under the microscope, the rock is seen to consist of a microcrystalline groundmass composed of minute laths of feldspar, showing a trachytic structure and often a fluidal arrangement. In the groundmass are included well-defined phenocrysts of plagioclase, augite and biotite, also a few phenocrysts composed of a microperthitic intergrowth of two feldspars, one of which may be orthoclase. Some of the plagioclase individuals are twinned according to both the Carlsbad and Albite laws, which, when examined by Michel Lévy's method, were found to have the composition $Ab_1 \ An_1$.

In the second section, which is a highly vesicular variety, the vesicles nearly all show a narrow border of what appear to be zeolites which are just beginning to form in the cavities. The biotite, in this section, is dark brown in colour and contains little black needles arranged in skeleton patterns, which probably consist of rutile derived from the partial decomposition of the mica. The groundmass of this section is relatively more abundant than the vesicles and it is therefore not a true pumice, though it approaches one in appearance.

The rock is very fresh; and, from a comparison with the other rocks described, it would appear that this is a comparatively recent lava flow. It has the character and mineralogical composition of an andesite.

41. 17.—"Reddish-grey rock from the north side of Slate creek, near its mouth."—(Minister of Mines' Report for 1901; p. 1135.) Highly decomposed basic igneous rock, having the composition of an augite andesite. Under the microscope the rock is seen to possess a well marked porphyritic structure. The groundmass is microcrystalline, consisting of minute laths of feldspar, which often shows a fluidal arrangement, and a little chlorite and oxide of iron, representing alteration products of some ferromagnesian constituent. Through this are distributed large, well-defined lath-shaped crystals of plagioclase now almost entirely altered to rhombohedral carbonates; also phenocrysts of some ferromagnesian constituent now completely altered to a mixture of rhombohedral carbonates, quartz, chlorite and oxide of iron. The

rock shows a few vesicles now completely filled with decomposition products, such as chlorite and calcite. A few well-defined hexagonal crystals of fresh apatite of large dimensions occur scattered through the groundmass, also a few veins of calcite.

42. 8.—Fine-grained grey rock (minette) from Brewer creek, Upper Kettle river.—"About one mile from the mouth of Brewer creek, and in line with the foot-hills, there is an outcropping of the solid rock formation exposed in the banks of the creek. The formation here seems to be chiefly granite, alternating with dykes of fine-grained basic volcanic rocks, and occasionally, apparently, with still more recent and very acid dykes." (Minister of Mines' Report, 1901, p. 1132.) The sample in question is taken from one of the acid dykes. The hand specimen is a dyke rock, medium fine-grained and grey in colour. Under the microscope the rock is seen to be much altered and to be composed almost wholly of altered feldspar crystals twinned according to the Carlsbad law, on account of which, as well as from the total absence of albite twinning, they were assumed to be orthoclase. Small narrow laths of biotite are abundant, which, however, have undergone considerable alteration, in most cases being changed to chlorite. Secondary quartz, associated with calcite and apatite, is also noticeable, and, as accessory constituents, magnetite and pyrite. The groundmass, which consists of small feldspar individuals, also has a small amount of quartz, possibly secondary, distributed through it. There are a few vesicular cavities filled with zeolites. The rock corresponds in character and composition to a minette.

43. 53.—Porphyrite from *Rebecca* mine, Rock creek, west side of Kettle river, four miles above Rock creek; elevation 4,000 feet. "Here there is a quartz vein (strike S. 80° W.) carrying some chalcopyrite, selected samples of the ore running as high as 6 % copper, with a total value of $22 per ton." (Minister of Mines' Report, 1901, p. 1147.)

The hand specimen shows a compact, fine-grained, pale greenish-grey rock. Under the microscope it is seen to be very highly altered and to consist of a trachytic groundmass of plagioclase laths interspersed with grains of epidote and chlorite, in which are imbedded larger individuals of plagioclase, and forms which have once been occupied by phenocrysts of some ferromagnesian constituent now entirely altered to chlorite, epidote, zoisite, quartz and calcite. The rock is too much altered to enable a determination of its precise character to be made, but it is evidently some basic igneous rock allied to andesite.

44. 30.—Country rock (altered andesite) from West Fork of Kettle river, between West Bridge and Stuart's hotel.

"The general character of these deposits may be said to be iron sulphides carrying values in gold and occurring in small quartz veins in granite, porphyry or other igneous rocks." (Minister of Mines' Report, 1901, p. 1145.)

Hand specimen shows fine-grained, pink-coloured rock, in which may be distinguished phenocrysts of hornblende, biotite and plagioclase. Under the microscope the rock is seen to be composed of a microcrystalline groundmass of feldspar and quartz, in which are imbedded phenocrysts of plagioclase containing inclusions of some alteration products; also biotite altered in many cases to chlorite, associated with which may often be seen sphene. There are also a few fresh-looking quartz individuals, and outlines now entirely filled with quartz, calcite, chlorite and epidote, which were once occupied by some ferromagnesian constituent, probably augite, as they often show forms indicative of that mineral. Magnetite and apatite are present as accessory constituents. The rock is an altered andesite.

It will be seen from the foregoing descriptions that most of the rocks described are andesites or closely related rocks. No. 40 (14) presents a striking contrast to the others in that, while they are much altered, it is fresh and has every appearance of being a comparatively recent eruptive.

INDEX.

A.

Page.
Abercraig 167
Aberdeen 181
Accidents:
  In Metalliferous Mines 215
  In Coal Mines 220, 232
  Tables of 234, 235, 236
Ajax 120
Athelstan 172
Agnes 193
Ahousat 193
Ah There 166
AINSWORTH MINING DIVISION 22, 140, 213
Ainsworth camp 141, 213
Alabama & Williams Companies 63
Alabama Group 52
Alberni Copper Co 191
ALBERNI DISTRICT 191
  Alberni Mining Division 191
  Clayoquot 192
  Quatsino Mining Division 194
ALBERNI MINING DIVISION 191
Alberta 139
Alice 149
Alice (Nicola) 182
Alice arm 53
Amazon 202
American 126
American Boy 136
American creek 53
American Girl 53
Anderson creek 58
Anderson Lake Mining & Milling Co 188
Anna S. 150
Antoine 136
Apex 177
Appendix: Petrography of Rock Samples 254
Arctic Slope Hydraulic M'g Co 71
Argenta Mines & Argenta Mines Co. 140
Arizona 52
Arkansas 52
Arlington 138
Arlington (Nelson) 148
ARROW LAKE MINING DIVISION 150
Arrow lakes 110
Ashanti Lands, Ltd 180
Ashcroft Mining Division 182
Aspen Grove camp 181
Assayers' Examination 35
Assayers, List of Licensed 35, 36
Assay Office 31
Athabasca-Venus Co 142, 143
Atlin & Willow Creek Gold Mining Co 39
Atlin Lake Co., Ltd 41
Atlin Mining Co 43
ATLIN MINING DIVISION 19, 20, 26, 38

B.

Badger 93
Baltimore Group 141
Bank of England 138
Bank of Fairview 175
Barbara 167
Bare mountain 181
Bayonne Group 149
Bay View 51
B. C. Coal Co., Ltd 174
B. C. Copper Co.'s Smelter 169
B. C. Exploring Syndicate 179
B. C. Group 176
B. C. mine 173
B. C. Southern Railway 28
B. D. S. creek 105
Bear creek (Chilkat) 47
Bear creek 186
Bear Hydraulic Co 59
Bear lake 136
Bear river 192
Beatrice 107, 133
Beatrice Group and Beatrice Mines, Ltd 107, 133
Beavis Group 44
Belvidere 192
Bennett and Chilkat Mining Divisions 26
BENNETT LAKE MINING DIVISION 46
Bennison Group 106
Berry creek 48
Betts and *Hesperus* 172
Betts and Hesperus Fraction 174
Big Bar (hydraulic lease) 188
Big Bend district 107, 108
Big Blue 52
Big Interior 192
"Big Ledge" (Pingston creek) 150
Big Oil Spring 88, 90
Big Sioux 181
Birch creek 41
Bismark 140
Bitter creek 53
Black Diamond 103
Black Eye 172
Black Jack gulch 71, 72
Black Prince 125
Black Prince (Slocan) 138
Black sand 20
Black Watch 149
Blue Bell 210
Blue Bird 194
Blue Canyon Partnership 41
Bonanza Group 53
Bondholder 139
Bornite mountain 26
Boseco Mines, Ltd 192
Bosun 136
Boulder 182
Boulder creek (Similkameen) 186
Boulder creek (Omineca) 70
Boulder creek 104
Boulder Creek (Atlin) 41, 44

Page.
Boulder Creek Hydraulic Mining Co ... 42
Boulder Mining Co., Ltd ... 186
BOUNDARY DISTRICT ... 21, 24, 28, 164, 213
  Greenwood Mining Division ... 164
  Grand Forks " ... 171
  Osoyoos " ... 175
Boundary Falls Smelter ... 170
Bounty on lead ores ... 22
Bounty ... 168
Breadwinners Group ... 71
Bridge River and Lillooet Gold Mining Co ... 189
Britannia Copper Syndicate ... 212
Britannia Group ... 212
British American Development Co ... 54
British America Dredging Co., Ltd ... 38, 39
British Canadian Gold and Silver Mines ... 179
British Columbia Copper Co ... 165
British Empire ... 178
British Pacific Gold Property Co ... 192
British Queen ... 185

Page.
Broken Hill ... 126
Broken Hill Mining and Development Co ... 147
Brooklyn ... 165
Brown Jug Group ... 193
Buckhorn ... 166
Building Materials ... 23
Bulkley River ... 52
Bull Creek and Bull Creek Hydraulic Synd ... 44, 93
Bullion and *Bimetallic* ... 52
Bullion Group ... 103
Bullion Group (Osoyoos) ... 175
Bull river ... 94
Bunyan or *Bunyon* ... 97, 103
Bureau of Mines (Work of the year) ... 30
Burnaby island mine ... 211
Burniston range ... 53
Burns mountain ... 66
Burnt basin ... 172
Burroughs bay ... 54
Butcher Boy ... 168

C.

Cadwallader creek ... 189
Calder creek ... 81, 83
Caledonia Gold and Silver Mining Co ... 72
Calumet and B. C. Mines ... 107, 127, 131
Camborne camp and Camborne ... 127
Camborne Group ... 127, 128, 133
Cameron Falls creek ... 86
Camp creek ... 108
Camp Hammell mining partnership ... 41
Camp McKinney ... 28
Canadian-American Development Co ... 51
Canadian King ... 148
Canyon creek ... 106
Canyon creek (Kettle River) ... 168
Capella ... 137
Capilano creek ... 212
Captain Jack ... 185
Carbonate (*Silver Belt*) ... 101
Cariboo Consolidated, Ltd ... 57
Cariboo creek ... 150
CARIBOO DISTRICT ... 15, 20, 56
  Cariboo Mining Division ... 56
  Quesnel " " ... 66
Cariboo Exploration Co., Ltd ... 63
Cariboo Gold Fields, Ltd ... 60
Cariboo Group ... 168
Cariboo McKinney mine ... 28
Cariboo mountains ... 57
Carpenter creek ... 137
Cascade creek ... 140
Cascade Power and Light Co ... 164, 169
CASSIAR DISTRICT ... 38
  Atlin Mining Division ... 38
  Bennett Lake Mining Division ... 46
  Chilkat Mining Division ... 47
  Northern Cassiar (Teslin, Liard and Stikine Divisions) ... 48
  Skeena River Mining Division ... 51
Castle syndicate ... 184
Cedar creek ... 141
Central camp ... 166, 177
Central Star mine ... 16, 154, 155, 157-160
Champion ... 182
Champion creek ... 186
Charlemont Group ... 103
Cherry creek ... 93
Cherry creek (Kamloops) ... 181
Cherry Creek Mining Co ... 178
Chieftain Group ... 150

CHILKAT MINING DIVISION ... 26, 47
Chilliwhack ... 212
China Creek Hydraulic Co ... 59
Cholla Group ... 129
Christian ... 104
Christina camp ... 172
Cinnamon Bear ... 192
CLAYOQUOT MINING DIVISION ... 192
Climax ... 192
CLINTON MINING DIVISION ... 188
Coal (*see* also Coal Mining in British Columbia):
  Table of production ... 12
  Statistics and comment ... 18, 19
  Queen Charlotte Islands ... 26, 210
  East Kootenay ... 27, 28, 94
  Cariboo ... 66, 217
  Omineca ... 70, 217
  Flathead river ... 85, 86
  Kettle river ... 174
  Yale ... 217
  Bulkley valley ... 217
Coal Creek Colliery ... 226, 227
Coal harbour ... 195, 196
Coal Hill Gold, Silver and Copper Mining Co ... 179
Coal Mine Managers:
  Examination ... 36
  List of ... 37
Coal Miners' Examination ... 37
Coal Mines Regulation Act, Prosecutions under. 233
Coal Mining in British Columbia ... 217
  Inspection of Vancouver Island mines ... 219
  Inspection of Crow's Nest Pass Collieries ... 219
COAST DISTRICT ... 21, 27, 191
  Vancouver Island ... 191
Coffee creek ... 64
Coke, Statistics (*See* also Coal Mining in British Columbia) ... 12, 18, 19, 232
Columbia ... 126
Columbia Hydraulic Mg. Co ... 40
Combination ... 167
Comox Collieries ... 222, 223
Comstock ... 137
Concentration of Ores ... 24, 25, 151
  Elmore process ... 151
  Wetherill Separator ... 98
  Hendryx process ... 153
  Rossland Power Co ... 154
Conductor ... 137
Consolidated Cariboo Hydraulic Mg. Co ... 20, 67-69

Page.
Consolidated Spruce Creek Placers, Ltd 40
Consolidated White Bear Mining Co 162, 155
Constitution 191
Contact & Contact Consolidated Gold Mines, Ltd 174
Cooper creek 140
Copper 23
Copper Belle 182
Copper camp 166
Copper Hill 210
Copper island (Q. C. I.) 210
Copper King Group 176
Copper King Group (Kamloops) 180
Copper mountain 186
Copper Mountain Min. & Development Co 194, 201
Copper Mine (*Big Copper*) 166
Copper Queen Group 176
Copper Queen 26, 204, 215
Copper Standard 181
Cordillero Co 205
Cork 140

Page.
Cornell 26, 204, 214
Cornwall Group 150
Corona 192
Coronation 167
Cosmopolitan Group (lease) 38
Cranbrook and Kimberley Railway 75
Crawford creek 149
Creston 149
Cripple Stick 139
Criterion 129
Criterion (Grand Forks M. D.) 172
Cromwell 125
Crow 193
Crow's Nest Collieries 15, 19, 27, 94, 217
  Inspector's Report 225
Crown grants, List of 241
Crown King 126
Crown Silver 165
Cumberland Group 54, 55
Cunningham creek 59, 65

D.

Dabney 172
Daisy 52
Daly Reduction Co 177
Dandy 167
Davis creek 140
Dayton 139
Dayton Group (Grand Forks M. D.) 168
Deadwood camp 165
Dease lake and creek 48
Deer creek 193
Defiance 167
Delanger 150
Democrat 137
Deserter 103
Dewdney Canadian Syndicate 192
Diamond C. Group 103
Disappointment inlet 193
Discovery 52
Discovery Gold Mining Co 64
Dividend Group 176

Dixie creek 43
Dolphin Group 176
Dominion Consolidated Mines Co., Ltd 175
Dominion Copper Co 165
Dominion Group 176
Don Pedro 167
Dora 210
Double Standard 148
Dredging for gold 20
  Cariboo 66
  Atlin 38
  Lillooet 189
Dry Hill Hydraulic Co 52
Duchess 103
Duncan river 110
Duncan United Mines 144
Dundee 147
Dutch creek 103
Duquesne Mining Co 108
Dynamo 167

E.

Earth (lease) 38
Eastern Hydraulic Mining Co 39
EAST KOOTENAY DISTRICT 27, 73, 213
  Fort Steele Mining Division:
    Report of Provincial Mineralogist 73
    Report of Gold Commissioner 92
  Windermere Mining Division:
    Report of Provincial Mineralogist 96
    Report of Gold Commissioner 102
  Golden Mining Division 105
East Kootenay Placer Mining Co 78, 94
Eclipse 189
Ecstall river 26
Edison 194, 195, 200
Edith Group 192
Eight-Mile lake 64
Eldorado 52
Elk 202
Elkhorn 167
Elkhorn Group 176
Elk river 192
Elliot creek 186
Elmore Oil Process 151

Emma 173
Empire 104
Empress 150
Engineer Group 44
English Counties Hydraulic Syndicate 42
Enterprise 139
E Pluribus Unum Group 167
Estella Group 93
Ethel 125
Ethiopia 166
Eureka mine 72
Eureka mountain 185
Eva Group 107, 127, 131
Eva (*Eva Group*) 127, 131
Evening Star 172
Evening Star (Osoyoos) 176
Evening Star (Kamloops) 180
Evening Star (Lillooet) 189
Examinations:
  Assayers 35
  Coal Mine Managers 36
  Coal Miners 37
  Extension Collieries 223

F.

Page.
Fairview camp 175
Fantantine 172
Ferguson 109
Fern mine 145
Fire Valley creek 150
First Effort 105
First of May Co 61
Fisher Maiden 136
Fish River valley 107, 110, 112, 127, 128
Flagstaff Group 175
Flathead River District 30, 79, 95
  Summary Report by Provincial Mineralogist 79-92
Flathead river 81-92, 93
  North Fork of 80
Florida 52
Foghorn 142, 148
Fontenoy 169

Page.
Forest Chief 150
Forest Rose 61
Forest Rose Co 61
Fort Steele Mining Division 21, 27
  Report of Provincial Mineralogist 73
  " Gold Commissioner 92
Forty Thieves Group 189
43rd Mining and Milling Co 71
Forward inlet 194, 195
Fourth of July (*Wilcox*) 147
Fourth of July creek 174
Franklin camp 172
Fraser river 20
Fraser River Gold Dredging Co 182
Frederick arm 205
Fremont 167
French creek 107, 108

G.

Galton range 80
Gardiner's inlet 52
Gem Group 176
General Developments of the year 24
Geographic Board of Canada 253
Geology:
  Flathead district 85, 87, 88, 91, 92
  Trout Lake Mining Division 111, 116, 121
  Lardeau " 127
  Quatsino sound 196, 197, 198
George Group 107, 108, 109
George Island mine 211
Giant 162, 155, 28
Giant (Nicola) 181
Gilman 107
Glacier creek 125
Gladstone Hydraulic Mining Co 40
Gleaner Group 44
Glen Iron Mines 181
Goat creek 53
Goat mountain 133
Goat River Mining Division 149
Golconda 182
Gold 19
  Placer (*see* also Placer Gold Mining) 15, 19
  Hydraulicing 20
  Dredging 20
  Lode gold 16, 21
Gold Belt Development Syndicate 125
Gold Bug 107
Gold Bug (Greenwood Mining Division) 167
Gold Commissioners and Mining Recorders, List of 251
Gold Cup 148
Golden Crown 174
Golden Crown Group 51
Golden Gate 52
Golden Mining Division 105
Golden River Quesnel Co 69

Golden West 126
Gold Finch 107, 128, 133
Gold Finch (Greenwood Mining Division) 167
Gold Hill 116
Gold Hill and Silver Crown 144
Goldman Group 176
Gold Melting and Assaying 31
Gold Mining (*see* also Gold):
  Placer 15
  Lode 16
Gold Park 113, 126
Gold River Mining and Power Co 94
Gold Run creek 38, 39, 40, 44
Gold Smith 116
Goldsmith Group 212
Good Hope Group 193
Good Luck Group 106
Graham creek 44
Grand Trunk Pacific Railway 56, 70
Granby Consolidated Mining, Smelting & Power Co 164
  Smelter 171
Grand Forks Mining Division 171
Granite (see *Poorman-Granite*) 144
Granite (Goat river) 149
Granite creek 186
Grave creek 81, 82
Gray creek 149
Great Hopes 166
Great North-western Mines Ltd 107, 114, 116, 129
Great West 52
Great Western Mines 120, 124
Greenwood Camp 164
Greenwood Mining Division 164
Greenwood Smelter 169
Gribbell Island and Gribbell Island Copper Co 51
Grizzly 192
Grouse creek 65

H.

Hall creek 145
Hall Mining and Smelting Co 142
Hamill creek 140
Hamilton 139
Hamlet 74
Hampton 139
Handy 126
Happy John Group 191
Hard Money 53

Hardscrabble Co 52
Harewood mine 222
Harrison river 212
Haskins creek 126
Hayes mine 181
Head bay 193
Heino's mine (Q. C. I.) 210
Helen 167
Helen (Quatsino) 201

Page.
Helga Gold and Copper Co ... 193
Hendryx mill ... 153
Hesperus Gold and Copper Mining Co ... 172
Hesquoit lake ... 193
Hettie Green Group ... 193
Hewett ... 137
Hidden creek ... 53
Highland valley ... 183
Highland (Kootenay, B.C.) Mining Co ... 141
Highlander Mill & Mg. Co. (Highlander Mine) ... 141
Highland Light ... 139
Highland Mary and Highland Mary Fract. (*Eva Group*) ... 127, 131

Page.
Home Run ... 126
Homestake ... 107
Hoodoo ... 139
Hope ... 74
Horsefly Gold Mining Co ... 66
Horsefly Hydraulic Mining Co ... 67
Horse Thief creek ... 97, 104
Hot Punch Group ... 103
Howard Fraction ... 139
Hunter V ... 28, 142, 148
Howe Sound ... 27
Hydraulic Gold Mining ... 20

I.

Idaho-Alamo ... 136
ILLECILLEWAET MINING DIVISION ... 107, 108, 109
Imperial ... 104
Imperial (Lillooet) ... 189
Imperial Development Syndicate ... 128, 129
Imperial Group ... 44, 114, 129
Independence Group ... 176
Independence mountain ... 176
Indian Chief Group ... 27, 192
Ingersol ... 194
Ingersol river ... 194
Inland Empire ... 163
Inspection of Metalliferous Mines ... 213
International Gold Mining Co ... 185
Iowa Lillooet Gold Mining Co ... 189
Iron ... 23
  Goat River Mining Division ... 149

Iron—*Concluded:*
  Nootka ... 193
  Quatsino ... 195, 202
Iron Cap (*Ptarmigan*) ... 99
Iron Mask Group ... 179
Iron mountain ... 52
Iron Mountain Syndicate ... 202
Ironsides ... 164
Ironsides (Clayoquot) ... 192
Island Belle ... 192
Island mountain ... 66
Ivanhoe ... 135
I. X. L. ... 125
I. X. L. (Trail) ... 162
I. X. L. (Nicola) ... 182
I. X. L. (Quatsino) ... 202

J.

Jack of Clubs creek ... 63
Jack Pot Fraction ... 172
Jervis inlet ... 212
Jessie F ... 163
John L. ... 126

Jumbo fork ... 103
Jumbo mine ... 155, 162
Juneau Group ... 105
June Group ... 194, 198, 201
Juno Mines, Ltd., and *Juno Group* ... 145

K.

Kalappa ... 193
Kalispel ... 139
KAMLOOPS MINING DIVISION ... 179
Kaslo creek, S. Fork of ... 140
Keithley creek ... 69
Kennedy lake ... 192
Kennedy mountain ... 186
Kentucky ... 52
Keremeos creek ... 177
Kettle river—Main ... 168
  " —West Fork ... 168, 174
Keystone ... 148
Kilo ... 139
King Edward ... 175
King Edward Mines, Ltd ... 175
King Group ... 185

King Solomon ... 166
King Solomon's Dream ... 182
King Solomon's Mines Co ... 141
Kish-e-neh-na creek ... 80, 81, 86, 87, 90
Kitchener iron ore ... 149
Kitimat arm ... 51
Kitsilas canyon ... 52
Klaskeno inlet ... 195
Klehini river ... 47
Knob Hill ... 164
Koksilah river ... 209
Kootenay Central Railway ... 93
Kootenay Mine (Rossland-Kootenay) ... 161, 162
Kootenay river ... 93
Koprino harbour ... 197

L.

Labour:
  Conditions ... 15
  In metalliferous mines ... 17
  In collieries ... 218, 219
Labourers' Co-operative Gold, Silver and Copper Mining Co., Ltd ... 106
Lade Group ... 114
Lanark ... 107, 109
Lancashire Fraction ... 167

Lancaster ... 172
Lardeau creek ... 122, 124
LARDEAU MINING DIVISION ... 21, 29, 107, 213
  Report of Provincial Mineralogist ... 127
  " Gold Commissioner ... 130
Lardeau Valley Mines, Limited ... 126
Last Chance ... 136
Lavina-Butte Group ... 140
Law creek ... 104

Page.
Laws claims (Q. C. I.) 211
Lead 21
  Bounty on 22
Lead Queen Group 105
Lemon creek 139
Lenora mine 209, 214
Lenora Group 103
Leora 192
Le Roi Mining Co 155-157
Le Roi No. 2, Limited 155, 157
Lexington mountain 107, 129
Lewis creek 93
L. H. Group 137
LIARD MINING DIVISION 20, 26, 48
Lightning creek 57, 58, 59
LILLOOET DISTRICT 29, 188
  Clinton Mining Division 188
  Lillooet Mining Division 188
Lillooet Hydraulic Co 189
Lillooet river 212
Link creek 202
List of accidents in metalliferous mines 215
  " " in coal mines 236
Liverpool 186

Page.
Lode gold mining 21
  Derivation of production 21
Lodgepole creek, East Fork of 80
London 52
London (Nicola) 182
London (Similkameen) 186
Lone Star 149
Long Lake Camp 166
Lorna Doone 137
Lorne creek 26, 52
Lorne Group 189
Lost Chord 180
Lost creek 70
Louisabelle 185
Loyal 27, 205
Lowhee creek and *Lowhee* 59
Lucky Boy Group 123, 125
Lucky Jack Group 107, 112, 114, 126
Lucky Jim 136
Lucky Strike Group 148
Lucy 52
Lyle creek 140
Lynn creek 212

M.

Mabel 210
Mabou 139
Maclean creek 106
Maggie 181
Maggie May Group 112
Magnetic concentration 25
Mammon Fraction 172
Manchester 182
Manson creek 70, 71
Maple bay 53
Maple Leaf 150
Maple Leaf Group 176
Marble Bay mine 26, 204, 214
Marble creek 203
Margaret 52
Marguerite 166
Marjorie 167
Mark creek 74, 75
Marquis and Gilbert group of claims 113
Marysville and Marysville smelter 75
Mathieson Group 177
Matilda creek 193
May and Jennie mine 142, 143
Mayflower Group 176
Mayflower Mining Co 71
McCulloch creek 107, 108
McDonald creek 97, 99, 104
McDonald Mines, *see Ptarmigan* 97
McGregor, Thompson and Ross claim 65
McGuigan basin 137
McGuire 52
McKee Consolidation 43
McKee Consolidated Hydraulic, Ltd 43
McKee creek 43, 44
McKinney camp 28
McKinnon mine 72
McLaughlin Group 140
McPhail Group 178
McRae Copper Mines 166
Meadow creek 140
Meadow Group 150
Mercury 136
Meteor 138
Metropolitan Gold and Silver Mining Co 122, 125
Metalliferous mines, Accidents in 215
Method of computing production 7

Mexican Group 195
Michel Colliery 228, 229
Michel creek, South Fork 81
Midge creek 148
Midnight Star 176
Mill creek 182
Millie Mack 150
Mineral claims:
  Atlin 44
  Cariboo 66
Mineral creek 150
Mineral determinations, Free 31
Mineral King 103
Mineral Museum 34
MINERAL PRODUCTION OF BRITISH COLUMBIA 7
  Statistical tables 7 to 14
  Table I.—Total production for all years up to and including 1903 7
  Table II.—Production for each year from 1890 to 1903 7
  Table III.—Amount and value of mineral products for 1901, 1902, 1903 8
  Table IV.—Production of mineral by Districts and Divisions 8
  Table V.—Yield of placer gold per year to date 9
  Table VI.—Production of lode mines 9
  Table VII.—Production in detail of the metalliferous mines for 1900, 1901, 1902, & 1903 11
  Table VIII.—Coal and coke production per year to date 12
  Tables IX and X.—Graphical tables showing comparative mineral production for 1902 and 1903 of B. C. and other Provinces of the Dominion 13, 14
  Table (graphical) of mineral production for all years to date (facing p. 13
  Table showing distribution of shipping mines and men employed 17
  Table of coal production and particulars of employees 218
  Tables of Accidents in mines 215
  " " collieries 234-240
Mineral resources of the Flathead Valley district 85
Mining, Progress of 15
Mining Recorders & Gold Commissioners, List of 251
Mohawk 107

Page.
Mohican 125
Mollie Hughes 137
Molybdenum 28
Monarch 150
Monarch (Osoyoos) 176
Monashee Group 178
Monitor Group 135
Monitor mine 27, 191
Monongahela 172
Montezuma 52
Montezuma tunnel 77
Montreal & Boston Copper Co 165
  Smelter 170
Moresby island 52
Morning Star 52
Morning Star (Osoyoos) 175
Morrison & Morrison mines 165
Morrissey colliery 230, 231, 232

Page.
Mosquito creek 63, 64, 66
Mother Lode Group 165
Mountain Boy 53
Mountain Con 136
Mountain Goat 52
Mountain Lion Mining Co 126
Mountain Rose Group 176
Mountain View 182
Mount Baker & Yale Mining Co 179, 185
Mount Co 62
Mount Selwyn 70
Mount Sicker 27, 206
Moyie river 93, 94
Mucho Oro Co 61
Murphy Group 185
Myrtle Group 138
Mystic 165
Mystic (Quatsino) 194

N.

Nahmint mine 27, 191
Naiad 52
NANAIMO DISTRICT 204
  Nanaimo Mining Division 204
Nansen 139
National Hydraulic Mining Co 65
Nellie Cotton 165
NELSON DISTRICT 21, 142, 213
  Nelson Mining Division 142
  Goat River 〃 149
  Arrow Lake 〃 150
Nelson Group 107
Nelson Group (Osoyoos) 177
NELSON MINING DIVISION 28, 142
Nettie L. Group 120, 124
New Comstock Group 198
New Fairview Corporation 175
Newitt 71
Newton's Mine 215
New Vancouver Coal Mining & Land Co. (*see* Western Fuel Co).
New Westminster Mining Division 27, 212
Nickel Plate 103
Nickel Plate (Osoyoos) 28, 177
Nickel Plate & Kootenay Mines 161, 162
Nicola valley 181
No. 3 125
No. 3 Creek camp 105
No. 7 Group & No. 7 Mining Co 166

Non-Union lease 42
Nootka sound 193
Norah 51
North Columbia Gold Mining Co 40, 44
NORTH-EAST KOOTENAY DISTRICT:
  Windermere Mining Division:
    Report of Provincial Mineralogist 96
    Report of Gold Commissioner 102
Northern Belle 53
Northern Portion of Cassiar 48
North Kootenay Pass trail 81, 82
North Star 112, 126
North Star mine 73, 93, 214
North-Western Development Syndicate 107, 128
North-Western Trustees Securities Co., Ltd 129
NORTH-WEST KOOTENAY DISTRICT 107
  Revelstoke Mining Division 108
  Illecillewaet Mining Division 109
  Trout Lake Mining Division:
    Report of Provincial Mineralogist 109
    Report of Gold Commissioner 124
  Lardeau Mining Division:
    Report of Provincial Mineralogist 127
    Report of Gold Commissioner 130
Nottingham 182
Number One, Two, Three, etc. (*See* No. 1, 2, 3, etc.).
Nutcracker 205

O.

Observatory inlet 53
Ochre 113
O'Donnell river 43
Office Statistics:
  Atlin Mining Division 45
  Bennett Lake 〃 46
  Chilkat 〃 47
  Skeena 〃 55
  Omineca 〃 72
  Fort Steele 〃 95
  Windermere 〃 105
  Golden 〃 106
  Revelstoke 〃 109
  Trout Lake 〃 126
  Lardeau 〃 134
  Slocan 〃 137
  Slocan City 〃 139
  Ainsworth 〃 141
  Arrow Lake 〃 150
  Trail Creek 〃 163

Office Statistics—*Concluded*:
  Greenwood Mining Division 171
  Grand Forks 〃 174
  Osoyoos 〃 177
  Vernon 〃 178
  Kamloops 〃 182
  Ashcroft 〃 183
  Yale 〃 186
  Similkameen 〃 187
  Clinton 〃 188
  Lillooet 〃 190
  Alberni 〃 191
  Clayoquot 〃 193
  Quatsino 〃 195
  Nanaimo 〃 205
  Victoria 〃 211
  New Westminster 〃 212
Ohio 139
Oil—Analyses of 34, 89
  Prospecting for 95

Page.
Oil—*Concluded:*
  In Cariboo 24, 66
  In E. Kootenay 86–92
  Shales 24
Oil, concentration by 25, 151
Oil shales 24
O. K. Group 192
Olalla camp 175
Old Ironsides 164
Old Puss 185
Olga 194
Omineca and Peace River Mining Co. 71
OMINECA DISTRICT 70
Omineca Mining Division 70
Ontario 150
Ophir 113
Ophir (lease) 38, 39
Ophir Lade Co. 129, 133
Opulence Group 175
Oread 52
Ormond claims 193
Oro Denoro (Denoro Mines) 173
Orphan Boy Group 180
Osmiridium 32
OSOYOOS MINING DIVISION 28, 175
Ottawa 138
Otter creek and Otter Creek Hydraulic Co. 42
Outcrop 103
Outlook 103
Oyster 129
Oyster-Criterion Group 107, 114, 129

P.

Pacific Development and Improvement Co 189
Paladora Group 150
Paradise basin 103
Paradise Group 99, 101, 102
Paragon 51
Parsnip river, Coal found 70
Pass creek 80, 81
Payne mine 135
Paystone Group 104
Paystreak 195, 200
Peace river 70, 71
Peerless (Quatsino) 202
Peerless 51
Peerless (Lillooet) 189
Penticton 176
Perry creek 76, 93, 94
Perry Creek Hydr. Mining Co. and Perry creek 77, 79, 94
Petrography of rock samples from British Columbia 254
Petroleum (*see* Oil).
Phillips arm 205
Phillips creek 83
Pine creek 38, 40
Pine Creek Power Co. 39
Pinehurst 100, 101
Pinto 137
Pioneer 51
Pioneer Mining Co 138
Pitt lake and river 212
Placer gold (Statistics) 9, 19
Placer gold mining 19
  Cassiar 38, 47, 48, 52, 54
  Cariboo 56, 57
  Omineca 70
  Fort Steele 77-79, 85, 93
  Revelstoke 108
Placer Gold Mining—*Concluded:*
  Nelson 142
  Kamloops 181
  Ashcroft 182
  Yale 183
  Similkameen 186
  Clinton 188
  Lillooet 189
Platinum 23, 32
  Separation from gold 32–34
Pleasant Valley, Ltd 64
Poet Group 192
Pontiac Miller 53
Poorman-Granite 144
Poplar 109
Poplar Creek District 112
Poplar creek 126
Porcupine creek 47
Port Hope 139
Portland 181
Portland canal 53
Portland Consolidated Co. 53
Pretty Girl Group 104
Primrose 165
Prince Group 27, 192
Princess Royal Group 51
Princess Royal island 26, 51
Production (*see* Mineral Production).
Progress of mining 15
Protection island shaft 221
Providence camp 166
Providence mine 166
Province 140
Provincial Mineralogist—Work of year 30
Ptarmigan Group 97, 104
Puget Sound Iron Co 205
Pyritic smelting 153

Q.

Quartz Mining in Cariboo 66
QUATSINO MINING DIVISION 194
Quatsino sound 27, 194, 195, 196
Queen Bess 137
Queen Charlotte islands 26, 52, 210
QUESNEL MINING DIVISION 20, 66
Quesnel river 65
  S. Fork of 69

R.

Rainy Hollow 47
Rambler 136
Rambler (Greenwood) 168
Rapid creek 112, 126
Rawhide 177
Reco 136
Red Fox 137
Red Horse 149
Red Line (see *Ptarmigan Group*) 97
Red Mountain Group 93
Red Rock 200
Red Top (*May and Jennie*) 144

Page.

- *Republic* 138
- Revelstoke and McCulloch Creek Hydraulic Mining Co., Ltd 108
- REVELSTOKE MINING DIVISION 107, 108
- Richard III Mining Co. and *Richard III* 27, 209
- Riordan mountain 176
- *Riverside* 168
- *Riverside Group* 172
- *Roaring King Group* 93
- *Rob Roy* 172
- Roche river 186
- Rock creek 169
- Rock Samples, Petrography of 254
- *Rocky Ryan* 176
- *Roderick Dhu* 166
- *Roosevelt Group* 53
- Roosville 83
- *Rose* 51

Page.

- *Rose Group* 215
- Rose Harbour claim 211
- *Rose Marie Group* 192
- *Rosenthal* claim 71
- Ross and Thompson claim, Perry creek 79
- *Rossland* 129
- ROSSLAND DISTRICT 16, 21, 25, 28, 151, 213
  - Trail Creek Mining Division 151
- Rossland-Kootenay Mining Co 155, 161
- Rossland Power Co., Ltd 154
- *Royal Fraction* 181
- *Royal Group* 189
- *Royal Standard* 178
- Royalty, Atlin 46
- *Rowse Fraction* 137
- *Ruby* 166
- Ruby creek and Ruby Creek Mining Partnership 42
- Ruth mines 136

S.

- Sage creek 80, 81, 84, 87, 88
- *Sally* 168
- Salmon river 142
- Samson claim 103
- *Sapphire* 139
- *Sarah Jane* 52
- *Saucy Lass* and *Saucy Sally* 182
- Saw Mill Riffle (Yale) 184
- Scheelite (Ca WO_4) 138
- Schroeder creek 140
- *Scotia Group* 177
- *Seattle* 172
- *Seattle Group* 192
- *Second Relief* 148
- Selwyn mountain 70
- *Senator* 172
- Seymour creek 212
- *Shamrock Group* 102, 103
- *Shamrock Group* (Osoyoos) 176
- Sheep creek 93
- Sheldon's claim (Q. C. I.) 210
- Sherwood's claims 79
- *Shylock* 74
- *Sibley* 172
- Sidney inlet 27, 192
- Silver and Silver-Lead 21, 22
- *Silver Belt Group* 101, 103
- Silver Belt Mining Co 101, 103
- *Silver Crown Group* 103
- *Silver Crown* 107
- *Silver Crown* and *Gold Hill* 144
- Silver Cup Mines 116-120, 124
- *Silver Cup* 116, 118, 124
- *Silver Dollar* 107
- *Silver Hill* 149
- *Silver King* 28, 142, 143
- *Silver Queen Group* 104
- Similkameen Mining Division 186
- Siwash creek 29, 184, 185, 186
- Skedan 211
- SKEENA RIVER MINING DIVISION 26, 51
- Skidegate 210
- *Skincuttle Entrance* 52
- Skincuttle island mine 211
- Skookumchuck creek 93
- *Skylark* 167
- Skylark camp 167
- Slate (Q. C. I.) 211
- SLOCAN CITY MINING DIVISION 138
- Slocan Development Co 141
- SLOCAN DISTRICT 29, 135, 213
  - Slocan Mining Division 135

- SLOCAN DISTRICT—*Concluded:*
  - Slocan City Mining Division 138
  - Ainsworth Mining Division 140
- SLOCAN MINING DIVISION 22, 135
- *Slocan Star* 135
- Slough Creek, Ltd 62
- Snake creek 43
- Snowshoe creek 69
- Snowshoe mine 173
- Snowshoe mountain (Mineral claims) 69
- Société Minière 41
- *Society Girl Group* 93
- Soil in the Flathead valley 84
- *Solomon* 210
- SOUTH-EAST KOOTENAY DISTRICT 73
  - Fort Steele Mining Division 73
- *Southern Cross* 191
- *South Fork Group* 55
- South Kootenay Pass trail 81, 82
- *South Valley Group* 212
- *Speculator* 138
- Spillimacheen river 106
- *Spitzee* 155, 162
- Spring creek 99, 102
- Springer creek 138, 139
- Spruce creek 40, 44
- *Spyglass Group* 112, 126
- St. Anthony Exploration Co 71
- *St. Eugene* 93
- *St. George* 186
- *St. Lawrence* 186
- *St. Patrick* 51
- *Standard* 168
- Star Mining Co 185
- Statistics:
  - Tables 7–14
  - Comments on 15–24, 31
- *Steele Group* 105
- *Stella* 194
- *Stemwinder* (Osoyoos) 28, 175
- *Stemwinder* 165
- *Stewart* ledge 53
- STIKINE MINING DIVISION 48
- Stikine river, Second South Fork 48
- *Stockholm* 107
- Stout's gulch 61
- *Strathcona Group* 114
- *Strathmore* 167
- Sullivan Company's Smelter 75
- *Sullivan Group* 73, 74, 93, 214
- Sulphurets creek 54
- Summary report on the valley of Flathead river 79

Page.
Summit camp 172
Summit City camp 185
Summit Creek camp 149
Sunrise 202
Sunrise Fraction 193
Sunset and *Crown Silver* 165
Sunset Group 175
Sunshine 116, 118

Page.
Sunshine (Silver Belt) 101
Superior 172
Superior Group 198
Surprise 52
Susap creek 175
Swansea 96
Swede Group 112, 114, 116, 126

T.

Tables of production (*See* Mineral Production):
  Comments on 17, 18
Tecumseh Group 104
Teddy 51
Telkwa 52
Telkwa river 53
Tenderfoot creek 112, 126
Ten-Mile creek 139
Ten-Mile creek section 181
Tennessee 172
TESLIN MINING DIVISION 26, 48
Teta Group 195
Teta river 195, 198, 200
Texada island 26, 204
Theis Company 94
Thelma Group 193
Thibert Creek Hydraulic Mine 20, 48
Thistle 51
Thistle Gold Company, Ltd 64
Thunder Hill Co 96
Thurlow island 205
Timber—In the Flathead valley 84
Tin 23
Tobacco Plains 82, 83
Tobacco river 81, 82
Toby creek 100, 102, 103

Tom creek 72
Toulon 52
TRAIL CREEK MINING DIVISION 151, 213
Trails:
  From Manson to the Findlay 70
  North and South Kootenay Pass 81, 82
  In the Flathead district 82, 84
Tranquille creek 181
Treasury Fraction 174
Trilby 167
Triune 122, 125
Trout creek 125
Trout lake 109, 110
Trout Lake (town) 109
TROUT LAKE MINING DIVISION 21, 29, 213
  Report of Provincial Mineralogist 109
  Report of Gold Commissioner 124
  Topography and Geology of 110, 111, 112
Trout river 193
Troy Fraction 181
Trust 52
Two Friends 138
Tyee Copper Co 27 206
  Tyee mine 206, 214
  Smelter 207

U.

Uchucklesit harbour 191
U.L.L 182

Unuk river and *Unuk* 53, 54
Unuk River Syndicate 54

V.

Valdes island 205
Van Anda Copper and Gold Co 204
Vancouver 136
VANCOUVER ISLAND AND COAST 191
  Alberni District 191
    Alberni Mining Division 191
    Clayoquot Mining Division 192
    Quatsino Mining Division 194
Vancouver Island collieries 18, 19, 217
  Inspection of 219
Vancouver Island Mining and Development Co 209
Van Winkle bar 182
Velvet 155, 162

Velvet-Rossland Mine, Ltd 154, 155
Venus (*see* Athabasca-Venus Co.) 143
VERNON DISTRICT 178, 213
  Vernon Mining Division 178
Victoria (Nicola) 181
Victoria 192
VICTORIA DISTRICT 206
  Victoria Mining Division 206
Virginian 52
Vital creek 72
Vital Creek Mining Syndicate 72
Volcanic Group and Volcanic Mining and Development Co 172

W.

W. A. E 209
Wakefield and Wakefield Mines, Ltd 137
Wallace 210
Ward's hydraulic 66
War Eagle Group (Skeena) 51
War Eagle mine 16, 154, 155, 161
Warren creek 106
Wasa creek 93
Washburn 103
Washington 136
Water analyses 31

Waterloo and Waterloo Consolidated Mining and Milling Co 168
Waverly 107, 109
Waverly Hydraulic Co 65
Wellington Colliery Co 222
Wells 47
West Coast V. I 27
Western Fuel Co., Mines of 221
Westholme 209
Westmont 139
West of England 57

	Page.
West Vancouver Coal Co	195
Wetherill Separator	25
Tests by	98, 99
White Bear mine	155, 162
White Cap Group	104
White Elephant	172
White Moose Group	44
White Quartz	200
White's or Central camp	172
Whitewater creek	140
Wigwam river	80, 81, 82, 83
Wilcox	142, 147
Wild Horse creek	94, 147
Williams creek	61
Williamson creek	105
Willow river	56
Willow River Mining Co	63
Wilmer	96
Wilson creek	140
WINDERMERE MINING DIVISION	96, 102
Windermere town and lake	96
Winnipeg	173
Winter harbour	194, 195
Wolf creek	93
Woodberry creek	141
Wright creek	42
Wyoming Co	61

Y.

Yahk river	93
Yakinikak creek	81
YALE DISTRICT	179
Kamloops Mining Division	179
Ashcroft 〃	182
Yale 〃	183
Similkameen 〃	186
Yale Hydraulic Co	184
Yale Mining Division	29, 183
Yellow Head pass	56
Yellow Jacket	44
Ymir mine	28, 142, 145–147
Yonal's claim	211
Yreka and Yreka Copper Co	194, 198

Z.

Zinc	23

LIST OF ILLUSTRATIONS.

View up Sage Creek, Flathead District, East Kootenay	Frontispiece.	
Table for Saving Fine Gold from Dredging	Facing p.	32
British-American Dredging Co.'s Dredge, Gold Run, Atlin	〃	40
Atlin Dredge, Stern View, Showing Tailings Stacker	〃	48
Atlin Dredge, Showing Details of Gold-Saving Tables		
Lafontaine Camp, Lightning Creek—Cariboo Mining Division	〃	56
Cariboo Consolidated Co.'s Shaft House, Lafontaine, Cariboo		
China Creek Hydraulic Mine—Cariboo Mining Division	〃	64
Alabama Claim, Mosquito Creek, near Barkerville		
Marysville Smelter, Fort Steele Mining Division—Furnace Shed	〃	72
〃 〃 〃 〃 —Calciner Sheds		
Perry Creek Hydraulic Mine—Fort Steele Mining Division	〃	80
East Kootenay Placer Mining Co.'s Steam Shovel, Perry Creek		
Sage Creek, Flathead River, Showing Location of "Big Oil Spring"	〃	88
View from Ptarmigan Mine, McDonald Creek, Windermere Mining Division, S.E. Kootenay	〃	96
View down Basin, Paradise Mine, Windermere, N.E. Kootenay	〃	104
Looking up Paradise Basin, Windermere Mining Division, Showing Folding of Strata	〃	112
Le Roi No. 2 Co.'s Mill—Elmore Oil Process—Rossland	〃	152
Interior View—Showing Separators		
Town of Lillooet, B.C	〃	184
Iowa-Lillooet Gold Mining Co.'s Dredge at Lillooet, B.C		
Open Cut, Peerless Mineral Claim, Quatsino Sound	〃	192
Open Cut on June Group, Quatsino Sound		
Yreka Mine, Quatsino—Wharf and Lower Terminal	〃	200
Yreka Mine, Quatsino—Mine Buildings		
Sketch Map Showing Portion of Coal Lands, S.E. Kootenay	〃	216

VICTORIA, B. C.:
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1904.

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JUN - 5 1905

ANNUAL REPORT

OF THE

MINISTER OF MINES

FOR THE

YEAR ENDING 31st DECEMBER,

1904,

BEING AN ACCOUNT OF

MINING OPERATIONS FOR GOLD, COAL, ETC.,

IN THE

PROVINCE OF BRITISH COLUMBIA.

PRINTED BY
AUTHORITY OF THE LEGISLATIVE ASSEMBLY.

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VHCA

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REPORT

OF THE

MINISTER OF MINES,

1904.

To His Honour the Honourable Sir HENRI GUSTAVE JOLY DE LOTBINIÈRE, K.C.M.G.,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

The Annual Report of the Provincial Mineralogist upon the Mining Industries of the Province for the year 1904 is herewith respectfully submitted.

RICHARD McBRIDE,
Minister of Mines.

Minister of Mines' Office,
February, 1905.

LOOKING DOWN HOBOE CREEK FROM LAVERDIERE GROUP—SOUTHERN END OF ATLIN LAKE.

REPORT OF BUREAU OF MINES,

—BY—

WILLIAM FLEET ROBERTSON, PROVINCIAL MINERALOGIST.

To the Hon. Richard McBride,
Minister of Mines.

Sir,—I have the honour to submit herewith my Annual Report on the Mining Industry of the Province for the year ending December 31st, 1904.

The statistical tables give the total mineral output of the Province to date, and show in considerable detail the actual mineral production of the past year, as based on smelter or mill returns; also a summary of the production of each of the last four years, thus illustrating by comparison the progress made in productive mining during this period.

To facilitate comparison with information previously given, I have retained, as closely as was possible, the general form already established for such tables and for the Report.

I have the honour to be,
Sir,
Your obedient servant,
William Fleet Robertson,
Provincial Mineralogist.

Bureau of Mines, Victoria, B. C.,
February 13th, 1905.

MINERAL PRODUCTION OF BRITISH COLUMBIA.

METHOD OF COMPUTING PRODUCTION.

In assembling the output for the lode mines in the following tables, the established custom of this Bureau has been adhered to, viz.: The output of a mine for the year is considered that amount of ore for which the smelter or mill returns have been received during the year. This system does not give the exact output of the mine for the year, but rather the amounts credited to the mine on the company's books during such year.

For ore shipped in December the smelter returns are not likely to be received until February in the new year, or later, and have, consequently, to be carried over to the credit of such new year. This plan, however, will be found very approximate for each year, and ultimately correct, as ore not credited to one year is included in the next.

In the Lode Mines tables, the amount of the shipments has been obtained from certified returns received from the various mines, as provided for in the "Inspection of Metalliferous Mines Act, 1897." In calculating the values of the products, the average price for the year in the New York Metal Market has been used as a basis. For silver 95 per cent., and for lead 90 per cent., of such market price has been taken. Treatment and other charges have not been deducted.

TABLE I.—Total Production for all Years up to and including 1904.

Gold, placer	$66,803,403
Gold, lode	31,451,956
Silver	21,716,870
Lead	12,559,139
Copper	21,381,791
Coal and Coke	68,274,893
Building stone, bricks, etc	3,900,000
Other metals	113,799
Total	$226,201,851

TABLE II.—Production for each Year from 1890 to 1904 (inclusive).

1852 to 1889 (inclusive)	$71,981,634
1890	2,608,803
1891	3,521,102
1892	2,978,530
1893	3,588,413
1894	4,225,717
1895	5,643,042
1896	7,507,956
1897	10,455,268
1898	10,906,861
1899	12,393,131
1900	16,344,751
1901	20,086,780
1902	17,486,550
1903	17,495,954
1904	18,977,359
Total	$226,201,851

TABLE
SHOWING MINERAL PRODUCTION
OF
BRITISH COLUMBIA.

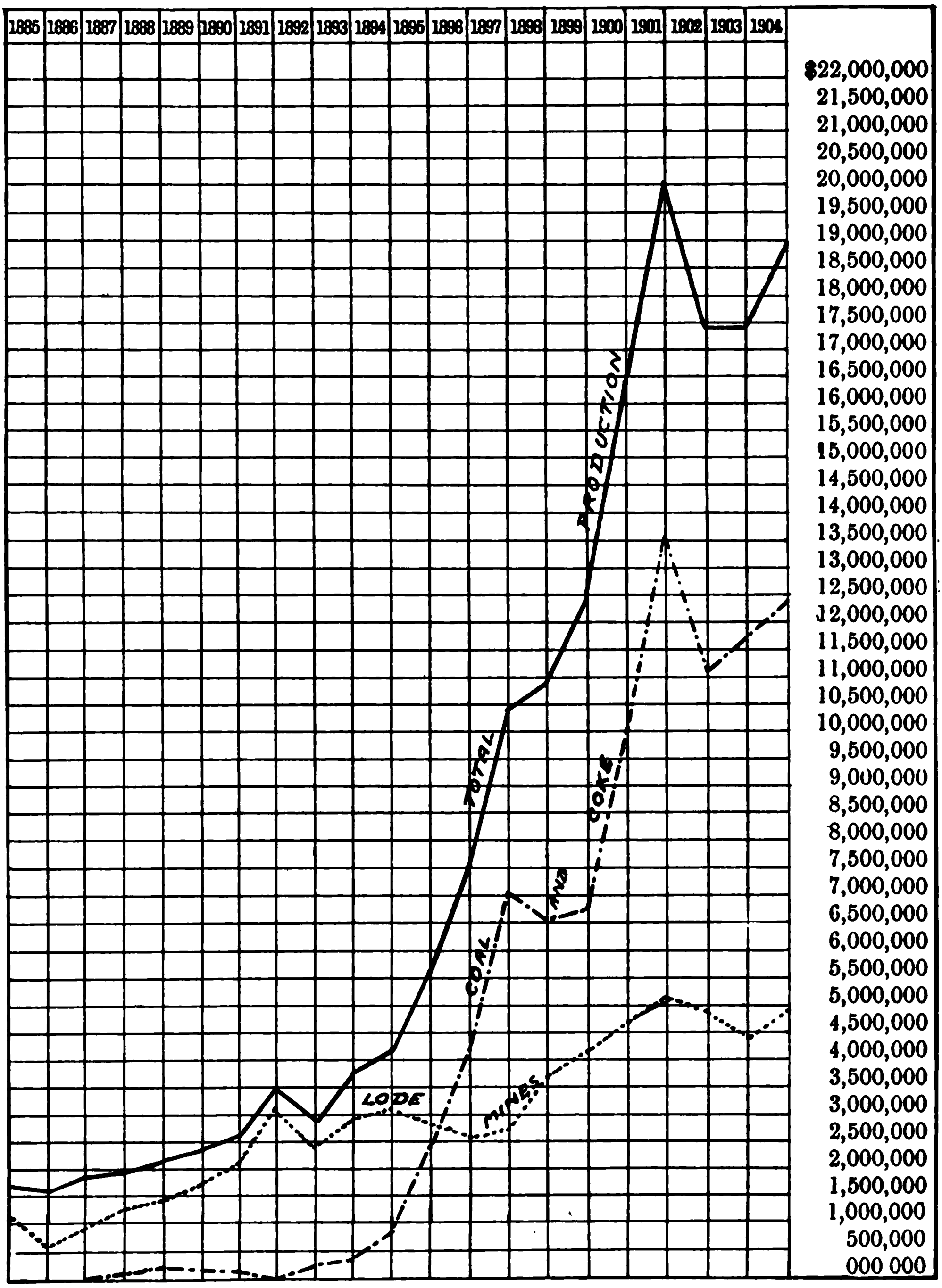

Table IV. gives a statement in detail of the amount and value of the different mineral products for the years 1902, 1903 and 1904. As it has been impossible as yet to collect accurate statistics regarding building stone, lime, bricks, tiles, etc., these are estimated.

TABLE IV.

AMOUNT AND VALUE OF MINERAL PRODUCTS FOR 1902, 1903 AND 1904.

	Customary Measure.	1902.		1903.		1904.	
		Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Gold, placer.....	Ounces.......	53,657	$ 1,073,140	53,021	$ 1,060,420	55,765	$ 1,115,300
〃 lode........	〃	236,491	4,888,269	232,831	4,812,616	222,042	4,589,608
Silver............	〃	3,917,917	1,941,328	2,996,204	1,521,472	3,222,481	1,719,516
Copper	Pounds	29,636,057	3,446,673	34,359,921	4,547,535	35,710,128	4,578,037
Lead	〃	22,536,381	824,832	18,089,283	689,744	36,646,244	1,421,874
Coal.............	Tons, 2,240lbs	1,397,394	4,192,182	1,168,194	3,504,582	1,253,628	3,760,884
Coke	〃 〃	128,015	640,075	165,543	827,715	334,102	1,192,140
Other materials...	....	....	480,051	....	531,870	....	600,000
			$ 17,486,550		$17,495,954		$18,977,359

TABLE V.

PRODUCTION OF MINERAL BY DISTRICTS AND DIVISIONS.

NAME.	DIVISIONS.			DISTRICTS.		
	1902.	1903.	1904.	1902.	1903.	1904.
CARIBOO DISTRICT..............	....	....	....	$ 540,395	$ 475,200	$ 474,600
Cariboo Mining Division	$ 340,395	$ 314,400	$ 313,000	....	....	....
Quesnel 〃	160,000	132,000	150,000	....	....	....
Omineca 〃	40,000	28,800	11,600	....	....	....
CASSIAR DISTRICT	....	....	....	426,636	480,368	558,573
KOOTENAY, EAST, DISTRICT	....	....	....	1,477,466	1,951,128	3,210,573
KOOTENAY, WEST, DISTRICT.....	....	....	....	7,806,399	6,603,981	5,806,070
Ainsworth Division...........	272,967	219,818	168,023	....	....	....
Nelson 〃	818,494	653,457	466,683	....	....	....
Slocan 〃	1,608,827	1,126,986	1,236,858	....	....	....
Trail Creek 〃	4,938,395	4,308,458	3,760,866	....	....	....
Other parts..................	167,716	295,262	173,640	....	....	....
LILLOOET DISTRICT.............	....	....	....	31,429	31,283	34,583
YALE DISTRICT	....	....	....	2,843,537	3,714,422	4,190,281
Osoyoos, Grand Forks & Greenwood Divisions.....	2,782,263	3,654,234	4,110,366	....	....	....
Similkameen Division.........	2,700	2,000	2,500	....	....	....
Yale 〃	58,574	58,188	77,415	....	....	....
COAST DISTRICTS (Nanaimo, Alberni, W. Coast V. I., Victoria)..	....	....	....	4,360,688	4,239,572	4,702,679
				$17,486,550	$17,495,954	$18,977,359

PLACER GOLD.

Table VI. contains the yearly production of placer gold to date, as determined by the returns, sent in by the banks and express companies, of gold transmitted by them to the mints, and from returns sent in by the Gold Commissioners and Mining Recorders. To these yearly amounts one-third was added up to the year 1878, from then to 1895 and from 1898 to 1904, one-fifth, which proportions are considered to represent, approximately, the amount of gold sold of which there is no record. This placer gold contains from 10 to 25 per cent. silver, but the silver value has not been separated from the totals, as it would be insignificant.

TABLE VI.—YIELD OF PLACER GOLD PER YEAR TO DATE.

1858....	$ 705,000	1874....	$ 1,844,618	1890....	$ 490,435
1859....	1,615,070	1875....	2,474,004	1891....	429,811
1860....	2,228,543	1876....	1,786,648	1892....	399,526
1861....	2,666,118	1877....	1,608,182	1893....	356,131
1862....	2,656,903	1878....	1,275,204	1894....	405,516
1863....	3,913,563	1879....	1,290,058	1895....	481,683
1864....	3,735,850	1880....	1,013,827	1896....	544,026
1865....	3,491,205	1881....	1,046,737	1897....	513,520
1866....	2,662,106	1882....	954,085	1898....	643,346
1867....	2,480,868	1883....	794,252	1899....	1,344,900
1868....	3,372,972	1884....	736,165	1900....	1,278,724
1869....	1,774,978	1885....	713,738	1901....	970,100
1870....	1,336,956	1886....	903,651	1902....	1,073,140
1871....	1,799,440	1887....	693,709	1903....	1,060,420
1872....	1,610,972	1888....	616,731	1904....	1,115,300
1873....	1,305,749	1889....	588,923		
		Total....................			$66,803,403

TABLE VII.—PRODUCTION OF LODE MINES.*

YEAR.	GOLD.		SILVER.		LEAD.		COPPER.		TOTAL VALUES.
	Oz.	Value.	Oz.	Value.	Pounds.	Value.	Pounds.	Value.	
		$		$		$		$	$
1887	....	....	17,690	17,331	204,800	9,216	....	....	26,547
1888	....	....	79,780	75,000	674,500	29,813	....	....	104,813
1889	....	....	53,192	47,873	165,100	6,498	....	....	54,371
1890	....	....	70,427	73,948	*Nil.*	*Nil.*	....	....	73,948
1891	....	....	4,500	4,000	*Nil.*	*Nil.*	....	....	4,000
1892	....	....	77,160	66,935	808,420	33,064	....	....	99,999
1893	1,170	23,404	227,000	195,000	2,135,023	78,996	....	....	297,400
1894	6,252	125,014	746,379	470,219	5,662,523	169,875	324,680	16,234	781,342
1895	39,264	785,271	1,496,522	977,229	16,475,464	532,255	952,840	47,642	2,342,397
1896	62,259	1,244,180	3,135,343	2,100,689	24,199,977	721,384	3,818,556	190,926	4,257,179
1897	106,141	2,122,820	5,472,971	3,272,836	38,841,135	1,390,517	5,325,180	266,258	7,052,431
1898	110,061	2,201,217	4,292,401	2,375,841	31,693,559	1,077,581	7,271,678	874,781	6,529,420
1899	138,315	2,857,573	2,939,413	1,663,708	21,862,436	878,870	7,722,591	1,351,453	6,751,604
1900	167,153	3,453,381	3,958,175	2,309,200	63,358,621	2,691,887	9,997,080	1,615,289	10,069,757
1901	210,384	4,348,603	5,151,333	2,884,745	51,582,906	2,002,733	27,603,746	4,446,963	13,683,044
1902	236,491	4,888,269	3,917,917	1,941,328	22,536,381	824,832	29,636,057	3,446,673	11,101,102
1903	232,831	4,812,616	2,996,204	1,521,472	18,089,283	689,744	34,359,921	4,547,535	11,571,367
1904	222,042	4,589,608	3,222,481	1,719,516	36,646,244	1,421,874	35,710,128	4,578,037	12,309,035
To'l	1,532,363	31,451,956	37,858,888	21,716,870	334,936,372	12,559,139	162,722,529	21,381,791	87,109,756

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* The information as to production in the earlier years is obtained from the "Mineral Statistics and Mines" for 1896, Geological Survey of Canada.

TABLE VIII.—COAL AND COKE PRODUCTION PER YEAR TO DATE.

COAL.

YEARS.	TONS (2,240 lbs).	VALUE.
1836-64	133,500	$ 535,012
1865	32,819	131,276
1866	25,115	100,460
1867	31,239	124,956
1868	44,005	176,020
1869	35,802	143,208
1870	29,843	119,372
1871-2-3	148,549	493,836
1874	81,547	244,641
1875	110,145	330,435
1876	139,192	417,576
1877	154,052	462,156
1878	170,846	512,538
1879	241,301	723,903
1880	267,595	802,785
1881	228,357	685,071
1882	282,139	846,417
1883	213,299	639,897
1884	394,070	1,182,210
1885	265,596	796,788
1886	326,636	979,908
1887	413,360	1,240,080
1888	489,301	1,467,903
1889	579,830	1,739,490
1890	678,140	2,034,420
1891	1,029,097	3,087,291
1892	826,335	2,479,005
1893	978,294	2,934,882
1894	1,012,953	3,038,859
1895	939,654	2,818,962
1896	896,222	2,688,666
1897	882,854	2,648,562
1898	1,135,865	3,407,595
1899	1,306,324	3,918,972
1900	1,439,595	4,318,785
1901	1,460,331	4,380,993
1902	1,397,394	4,192,182
1903	1,168,194	3,504,582
1904	1,253,628	3,760,884
Total	21,243,018 tons.	$64,110,578

COKE.

1895–6	1,565	$ 7,825
1897	17,831	89,155
1898 (estimated)	35,000	175,000
1899	34,251	171,255
1900	85,149	425,745
1901	127,081	635,405
1902	128,015	640,075
1903	165,543	827,715
1904	238,428	1,192,140
Total	832,863 tons.	$ 4,164,315

TABLE IX.—PRODUCTION IN DETAIL OF THE

DISTRICT.	YEAR	TONS.	GOLD—PLACER.		GOLD—LODE.		SILVER.		COPPER.	
			Ounces	Value.	Ounces.	Value.	Ounces.	Value.	Pounds.	Value.
				$		$		$		$
Cariboo										
Cariboo Division	1901		13,980	279,600						
	1902	21	17,000	340,000	19	393	4	2		
	1903		15,720	314,400						
	1904		15,650	313,000						
Quesnel "	1901		12,000	240,000						
	1902		8,000	160,000						
	1903		6,600	132,000						
	1904		7,500	150,000						
Omineca "	1901		955	19,100						
	1902		2,000	40,000						
	1903		1,440	28,800						
	1904		580	11,600						
Cassiar										
Atlin Lake Division	1901	8	15,000	300,000						
	1902		20,000	400,000						
	1903		22,000	440,000						
	1904		26,500	530,000						
All other Divisions	1901		1,140	22,800	5	103	82	46		
	1902	100	800	16,000	474	9,797	224	111	6,258	728
	1903	67	1,750	35,000	244	5,043	53	27	2,249	298
	1904	303	575	11,500	766	15,833	185	99	8,900	1,141
East Kootenay										
Fort Steele Division	1901	62,934	630	12,600			718,451	402,333		
	1902	3,621	1,650	33,000			114,506	56,738		
	1903	938	1,000	20,000			28,537	14,491		
	1904	76,895	* 1,000	20,000			590,186	314,923		
Windermere-Golden	1901	838	40	800			34,181	19,141	3,272	527
	1902	260			16	331	27,918	13,833	8,048	936
	1903	808			17	352	59,006	29,963	2,730	361
	1904	365	50	1,000			20,964	11,186	5,472	701
West Kootenay										
Ainsworth Division	1901	5,938			63	1,312	324,913	181,951		
	1902	4,939			5	103	320,719	158,916	9,537	1,109
	1903	24,332			33	682	108,678	55,187		
	1904	14,569			2	41	90,004	48,026		
Nelson "	1901	109,226			32,868	679,340	377,167	211,213	1,599,449	257,671
	1902	77,810			25,116	519,148	273,870	135,703	491,144	57,120
	1903	76,923	100	2,000	20,114	415,756	190,003	96,453	346,218	45,622
	1904	74,442	* 150	3,000	14,100	291,447	198,795	106,077	220,500	28,268
Slocan & Slocan City	1901	25,493			244	5,043	2,276,259	1,274,705		
	1902	21,153			353	7,297	2,223,810	1,101,898		
	1903	12,412			257	5,312	1,466,931	744,908	181	24
	1904	70,296			160	3,307	1,540,170	821,835		
Trail Creek "	1901	283,360			132,333	2,735,323	970,460	543,458	8,333,446	1,342,518
	1902	329,534			162,146	3,351,558	373,101	184,871	11,667,807	1,356,966
	1903	360,786			145,353	3,004,446	209,537	106,403	8,652,127	1,145,109
	1904	312,991			133,095	2,751,074	181,830	97,024	7,119,876	912,768
All other Divisions (Revelstoke, Trout Lake, Lardeau.)	1901	930	100	2,000	234	4,837	133,774	74,913		
	1902	1,692	100	2,000	652	13,477	241,584	119,705	1,000	116
	1903	5,430	100	2,000	2,417	49,959	392,354	199,237	3,294	436
	1904	26,494	* 50	1,000	3,615	74,722	148,201	79,080		
Lillooet										
	1901	4,150	1,304	26,080	1,079	22,303				
	1902	2,882	1,372	27,440	193	3,989				
	1903	3,652	1,291	25,820	264	5,457	12	6		
	1904	40	1,725	34,500	4	83				
Yale										
(Grand Forks, Greenwood and Osoyoos Divisions.)	1901	396,210	250	5,000	37,388	772,810	241,489	135,234	14,511,787	2,337,849
	1902	521,402	250	5,000	42,745	883,539	219,798	108,910	14,955,582	1,739,334
	1903	697,284	150	3,000	50,358	1,040,900	320,749	162,876	18,485,542	2,446,561
	1904	801,925	* 150	3,000	55,505	1,147,288	245,155	130,815	22,066,407	2,828,913
Similkameen Div'n. (Vernon.)	1901		234	4,680						
	1902		135	2,700						
	1903		100	2,000						
	1904		† 125	2,500						
Yale Division (Ashcroft, Kaml'ps.)	1901	3,374	2,272	45,440	18	370	74	41	39,920	6,431
	1902	3,783	2,350	47,000	6	124	542	289		
	1903	22	2,520	50,400	3	62	15	8	6,409	848
	1904	1,906	1,560	31,200	183	3,783	625	334	328,380	42,098
Coast & other Districts (Nanaimo, Alberni, W. Coast V. I., Victoria).										
	1901	27,965	600	12,000	6,152	127,162	74,483	41,710	3,115,872	501,967
	1902	31,802			4,766	98,513	121,841	60,372	2,496,681	290,364
	1903	103,524	250	5,000	13,771	284,[illegible]	220,329	111,883	6,861,171	908,076
	1904	81,383	* 150	3,000	14,612	302,030	206,366	110,117	[illegible],593	764,148
Miscellaneous (other metals, building stone, brick, etc.)										
	1901									
	1902									
	1903									
	1904									
TOTALS	1901	920,416	48,505	970,100	210,384	4,348,603	5,151,333	2,884,745	27,603,746	4,446,963
	1902	998,999	53,657	1,073,140	236,491	4,888,269	3,917,917	1,941,328	29,636,057	3,446,673
	1903	1,286,176	53,021	1,060,420	232,831	4,812,616	2,996,204	1,521,472	34,359,921	4,547,535
	1904	1,461,609	55,765	1,115,300	222,042	$4,589,608	3,222,481	$1,719,516	35,710,128	$4,578,037

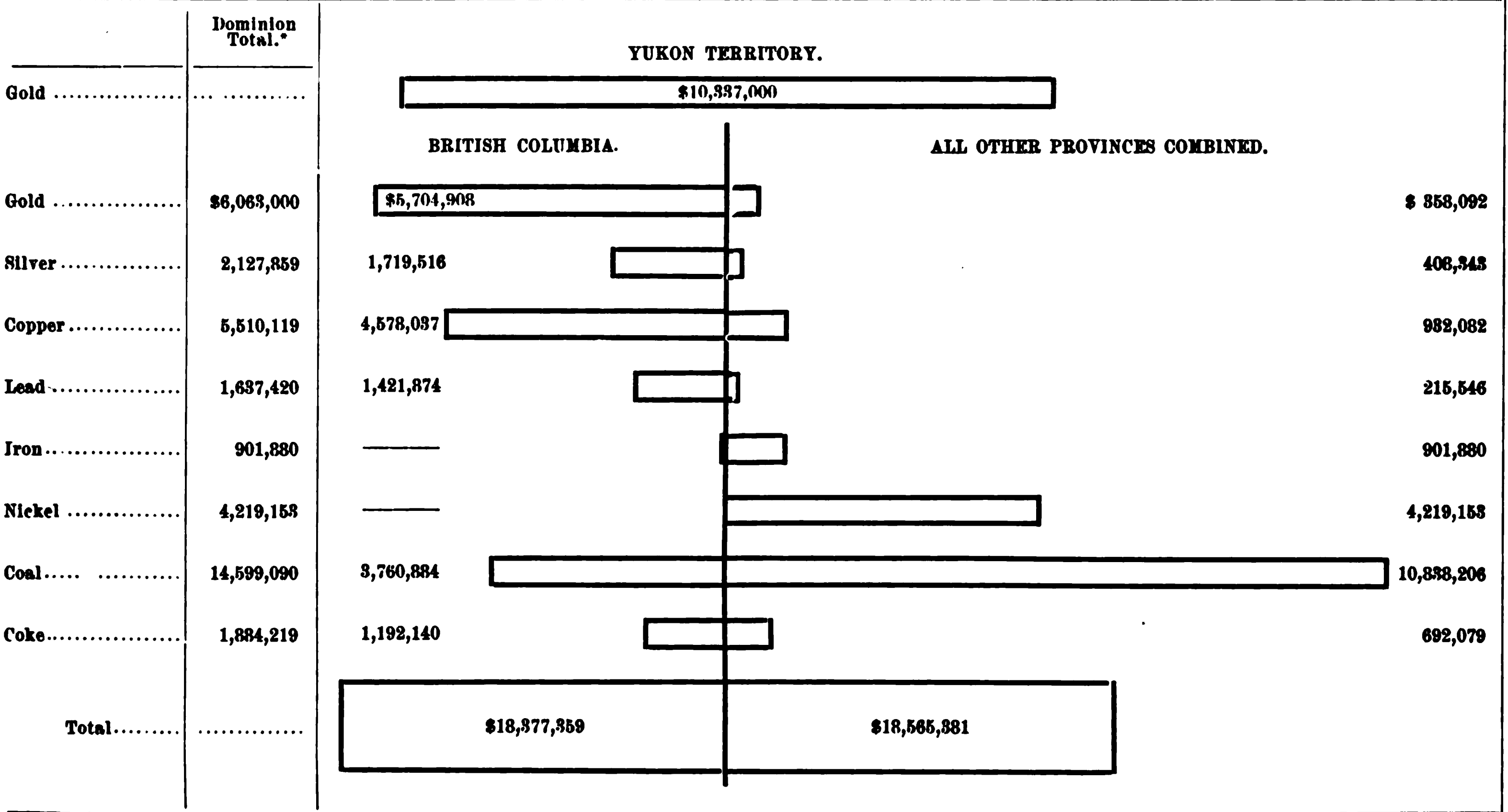
* Estimated. † Platinum, in 1904, $420 (included in Placer Gold).

METALLIFEROUS MINES FOR 1901, 1902, 1903 AND 1904.

LEAD.		TOTALS FOR DIVISIONS.				TOTALS FOR DISTRICTS.			
Pounds.	Value.	1901.	1902.	1903.	1904.	1901.	1902.	1903.	1904.
	$	$	$	$	$	$	$	$	$
						538,700	540,395	475,200	474,600
		279,600							
			340,395						
				314,400					
					313,000				
		240,000							
			160,000						
				132,000					
					150,000				
		19,100							
			40,000						
				28,800					
					11,000				
						322,949	426,636	480,368	558,573
		300,000							
			400,000						
				440,000					
					530,000				
		22,949							
			26,636						
				40,368					
					28,573				
						1,592,663	222,778	128,797	1,180,933
29,129,128	1,127,036	1,541,969							
3,017,756	110,450		200,188						
717,479	27,357			61,848					
21,071,236	817,564				1,152,487				
775,016	30,226	50,694							
204,652	7,490		22,590						
961,296	36,273			66,949					
401,022	15,559				28,446				
						8,159,662	7,716,399	6,498,981	5,806,070
3,788,412	147,748	331,011							
3,083,039	112,839		272,967						
4,299,727	163,949			219,818					
3,091,648	119,956				168,023				
2,470,350	96,344	1,244,568							
1,680,948	61,523		773,494						
1,072,542	40,896			600,957					
976,570	37,891				466,683				
15,025,750	586,004	1,865,752							
13,651,144	499,632		1,608,827						
9,880,469	376,742			1,126,986					
10,611,227	411,716				1,236,868				
1,045	45	4,621,299							
			4,893,395						
				4,255,958					
					3,760,866				
391,844	15,282	97,032							
885,734	32,418		167,716						
1,144,239	43,630			295,262					
485,520	18,838				173,640				
						48,383	31,429	31,283	34,583
		48,383							
			31,429						
				31,283					
					34,583				
						3,307,948	2,787,356	3,707,552	4,190,281
2,397	93	3,250,986							
13,108	480		2,737,263						
23,531	897			3,654,234					
9,021	350				4,110,366				
		4,680							
			2,700						
				2,000					
					2,500				
		52,282							
			47,393						
				51,318					
					77,415				
						682,839	449,249	1,309,606	1,179,296
		682,839							
			449,249						
				1,309,606					
					1,179,296				
						417,238	480,051	531,870	600,000
		417,238							
			480,051						
				531,870					
					600,000				
51,582,906	2,002,733	$15,070,382				$ 15,070,382			
22,536,381	824,832		$12,654,293				$ 12,654,293		
18,099,283	689,744			13,163,657				$13,163,657	
36,646,244	$1,421,874				$14,024,335				$14,024,335

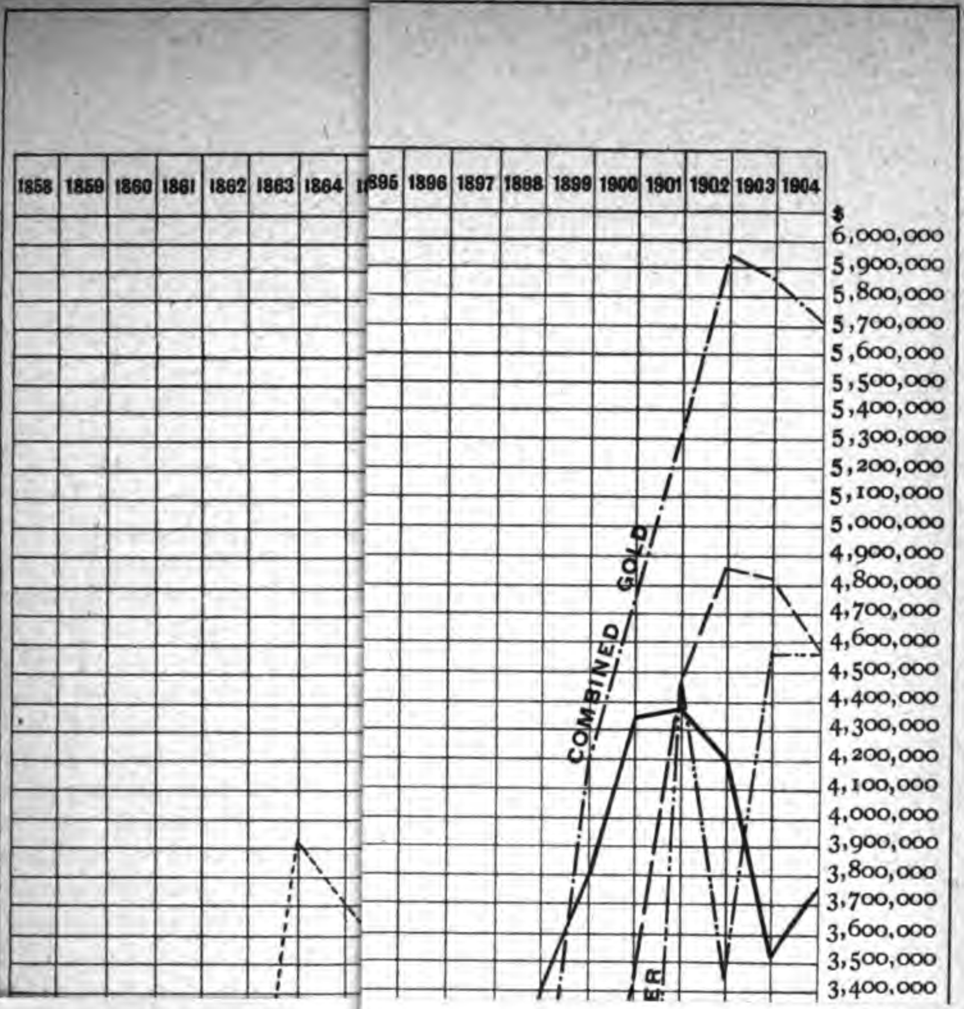
TABLE X.

Showing Comparative Mineral Production for 1904 of British Columbia and Other Provinces of the Dominion.



	Dominion Total.*	British Columbia.	All Other Provinces Combined.
Gold (Yukon Territory)	...	$10,337,000	
Gold	$6,063,000	$5,704,908	$ 358,092
Silver	2,127,859	1,719,516	408,343
Copper	5,510,119	4,578,037	932,082
Lead	1,637,420	1,421,874	215,546
Iron	901,880	—	901,880
Nickel	4,219,153	—	4,219,153
Coal	14,599,090	3,760,884	10,838,206
Coke	1,884,219	1,192,140	692,079
Total	...	$18,377,359	$18,565,381

* Figures taken from "Geological Surveys, Summary of Mineral Production of Canada in 1904."



the introduction of the "tribute system" of mining. The total number of men employed during the year in these shipping mines is almost exactly the same as in 1903, viz.: 3,306 as compared with 3,303.

The following table shows the number of metalliferous mines which shipped ore during the past year, together with the location of these mines and the number of men employed both above and below ground :—

Gold

Gold	
Silver	
Copper	
Lead	
Iron	
Nickel	
Coal	
Coke	
Total	

PROGRESS OF MINING.

The mineral output of the Province for the past year shows, as to the gross value of the product, a distinct gain over the preceding year, and, as a matter of fact, is the greatest ever made by our mines, except that of 1901. This gross value for 1904 is $18,977,359, and represents an increase over 1903 of $1,481,405, or about 8.5 %.

An analysis of the returns for the whole Province shows, however, that this increase has not been general or equal in the various districts, or as to the various minerals produced. The placer gold output shows an increase of $44,880, which is mainly attributable to one district, Atlin, the other districts only about holding their own; while in those districts where the placer gold is obtained from the river bars, exposed only at lowest water, there is this year a marked falling off in production, since the spring opened up early and the gradual melting of the snow in the mountains prevented any extremes of high or low water, so that the bars were not exposed and, therefore, could not be worked in the manner.

The districts showing an increased output this year, named in the order of precedence, were East Kootenay, the Boundary, the Coast, and the Slocan, while the greatest decrease was in the Rossland camp, this being accounted for by changes in the management of some of the producing companies, and by experiments as to the best methods of treatment of the low-grade ores of the camp being conducted; these temporarily retarded the output.

The tonnage of ore actually being mined in the Province has perhaps a more direct bearing upon the general business prosperity of the local community than have the values produced, inasmuch as it represents the amount of work actually taking place, and in this respect the year 1904 shows a very greatly increased output of ore, amounting to 1,461,609 tons, an increase over the preceding year of 175,433 tons, or nearly 14 %.

To say that this increase was made chiefly by the Boundary, East Kootenay and Slocan Districts, scarcely does these districts full justice, for not only have they made the increase shown, but they have also offset decreases in certain other districts.

In discussing the increase in tonnage of ore mined it must be remembered that the tonnage mined in 1903, than which that of 1904 is greater by 14 %, was itself greater than that of the preceding year (1902) by about 29 %, so that, looking back two years, we find the present tonnage output has increased in these two years about 46 %.

The number of mines shipping in 1904 was 142, as against 125 in 1903, an increase of 17, of which 15 were in the silver-lead district. These, however, shipped less than 100 tons each during the year. Of these 142 mines shipping, there were only 76 that shipped 100 tons during the year 1904, as against 74 in 1903, indicating that there has been no material addition to the larger shippers, such increase as has been made in the number of shipping mines being confined to the smaller high-grade properties, and being in reality largely due to the introduction of the "tribute system" of mining. The total number of men employed during the year in these shipping mines is almost exactly the same as in 1903, viz.: 3,306 as compared with 3,303.

The following table shows the number of metalliferous mines which shipped ore during the past year, together with the location of these mines and the number of men employed both above and below ground:—

TABLE SHOWING DISTRIBUTION OF SHIPPING MINES IN 1904.

	Tons of Ore Shipped.	No. of Mines Shipping.	No. of Mines Shipping over 100 tons in 1904.	MEN EMPLOYED IN THESE MINES.		
				Below.	Above.	Total.
CASSIAR:						
Skeena	303	2	1	7	9	16
EAST KOOTENAY:						
Fort Steele	76,895	2	2	199	75	274
Windermere	365	5	1	19	9	28
WEST KOOTENAY:						
Ainsworth	14,569	12	4	70	20	90
Nelson	74,442	17	12	150	115	265
Slocan	70,296	48	18	425	192	617
Trail	312,991	13	11	573	211	784
Other Divisions	26,494	10	6	99	130	229
LILLOOET	40	1	....	3	1	4
YALE:						
Boundary	801,925	20	14	439	276	715
Ashcroft-Kamloops	1,906	2	1	40	20	60
COAST	81,383	10	6	119	105	224
Total	1,461,609	142	76	2,143	1,163	3,306

In explanation of the table, it should be said that in its preparation, a mine employing 12 men for four months is credited in the table with four men for 12 months, so that the total given is less than the actual number of individuals who worked in mines during the year.

The "labour employed to the ton of ore mined" forms some criterion of the total cost of mining in a camp, since the cost of labour is in a more or less constant proportion to such total cost. In this respect it is interesting to note in the various districts the number of tons of ore mined to each man employed. An analysis of the above table shows, approximately, that, taking the Province as a whole, there were 443 tons of ore mined for each man employed about the mines. In this respect, however, the districts vary very materially, since in the Slocan district the figures show 114 tons mined to the man in the year, in the Nelson district 280 tons, in the Trail creek (Rossland) district 400 tons, and in the Boundary 1,121 tons.

Such generalisation, of course, does not apply exactly to any one mine, but only to the district, and in the first two districts mentioned the mines vary in character so greatly, some having high-grade shipping ores, and others low-grade concentrating ores, that care must be taken not to carry such average figures too far.

TABLE SHOWING NON-SHIPPING MINES AND NUMBER OF MEN EMPLOYED, 1904.

DISTRICT.	Number of Mines.	Men employed under ground.	Men employed above ground.	TOTAL.
AINSWORTH	7	32	14	46
BOUNDARY (Gd. Forks, Kettle R., Osoyoos)	4	7	4	11
COAST	2	5	5	10
LARDEAU AND TROUT LAKE	3	15	2	17
LILLOOET	1	14	7	21
NELSON	3	15	3	18
SLOCAN (Slocan, Slocan City)	3	6	6	12
EAST KOOTENAY (Fort Steele)	1	....	6	6
YALE	2	6	12	18
	26	100	59	159

RED MOUNTAIN, ON INTERNATIONAL BOUNDARY, NEW WESTMINSTER M. D.

With reference to the preceding statistical tables of the mineral production of the Province, the following is a summary of their contents:—

Table I. shows the total value, to the end of 1904, of each mineral product that has been mined in the Province. Of these, the total product of our coal mines this year, for the first time in the history of the Province, ranks first, amounting to $68,274,893, closely followed by placer gold at $66,803,403, while there has been produced of gold from lode mines $31,451,956. It is deemed proper to make a distinction here between placer and lode gold production, as the methods of mining this same metal are affected by conditions so totally different.

Comparing the production of the different metals or minerals, we find that the value of the gold produced, from all sources, is greater than that of any other metal or mineral, the combined production of gold, placer and lode, amounting to $98,255,359. Silver comes next, with a production of $21,716,870, followed by copper, with $21,381,791, and lead, with $12,559,139.

Table II. shows the total production that the mines of the Province made during each year from 1890 to 1904, and shows again for 1904 an increase over the preceding years. The production for 1904 had a gross value of $18,977,359, which amounts to over $100 per capita for the entire population of the Province, and the Table shows a steady rise since 1894 from $4,225,717 to the present figures, a proportionate increase of about 450 % in these 10 years.

Table III. presents in graphical form the facts contained in the figures of the preceding Table, and also shows by diagram the production for the past 20 years of our lode and coal mines. It will be noted that the lines representing these outputs are rising steadily and rapidly.

Table IV. gives the amount, in the customary units, and the values of the various mineral products which go to form the total production of the past year, and also, for purposes of comparison, the same data for the two preceding years. The Table shows in the placer gold production for 1904 an increase over the preceding year of $54,880, while in the production of lode gold there is a decrease of $223,008. The production of copper shows a small increase, while the lead production has been doubled, thanks to the Dominion Government bounty.

Among "other minerals" is included building stone, brick, lime, pottery, &c.; also zinc and iron ores, the latter used as a flux, of which no definite statistics are obtainable or standard of value fixed, and these have consequently to be estimated as closely as possible.

Table V. shows the mineral production of the various mining districts into which the Province is divided. The West Kootenay District produces a greater amount than any other, followed, in order of importance, by the Coast, Boundary and East Kootenay Districts. It must be noted that in the output of the Coast and East Kootenay Districts are included the products of the coal mines within their respective boundaries, and, further, that the Coast District includes the three cities of Victoria, Vancouver and Nanaimo, where the greater part of the building material of mineral origin is used. Of the individual camps, the Boundary has been the greatest producer as to values, and has mined more ore than all the rest of the Province combined, its tonnage of ore mined during the past year being over 800,000 tons.

Table VI. gives the statistics of production of the placer mines of the Province since 1858. This branch of mining it was that first brought British Columbia into notice as a mineral Province. Starting in 1858, the output of the placer mines increased, until, in 1863, it was nearly $4,000,000, the highest point reached, when the output gradually and regularly diminished until, in 1893, it was only $356,000. A turn for the better then set in—due, primarily, to the introduction of hydraulic methods—until the output was in 1899 $1,344,900, due to the newly discovered Atlin gold fields, and for the last five years it has averaged over $1,168,000 a year, being for the past year $1,115,300.

Table VII. shows the amount and value of the various metals produced by the lode mines of the Province since 1887, when this class of mining was begun in a small way. The Table shows that our lode mines have produced to date $87,109,756 worth of metals, of which there was produced in 1904 $12,309,035, an amount greater than that in 1903 by $737,668.

Table VIII. gives the production of the collieries of the Province from 1836 to 1904. The total output to date amounts to 21,243,018 tons of coal, having a value of $64,110,578, and 832,863 tons of coke, valued at $4,164,315, making a total valuation for the output of the collieries $68,274,893. In these figures the coal used in making coke is not included in the coal output, being represented by the coke produced. The coal output for 1904 was 1,253,628 tons of coal, valued at $3,760,884, and 238,428 tons of coke, valued at $1,192,140, the value of the total product being $4,953,024.

Table IX. gives in detail the production of the metalliferous mines (not including coal) for the years 1901-2-3 and 4, showing the tonnage of ore mined in each district, together with the quantity of its metallic contents and its gross market value. The total tonnage of ore mined during the year was 1,461,609 tons. This tonnage was mined in the various districts in the percentage of the whole, as given:—

Boundary,	54.9	% of tonnage and	30.0	% of values.
Trail creek,	21.3	"	28.0	"
Coast district,	5.6	"	8.8	"
Fort Steele M. D.,	5.2	"	8.6	"
Nelson,	5.1	"	3.5	"
Slocan,	4.8	"	9.2	"

Tables X. and XI. give, respectively for 1903 and 1904, a graphic comparison of the mineral products of British Columbia, as compared with the production of similar products by all the other Provinces of the Dominion combined. Table X. shows that in 1904 British Columbia produced of the metals and coal practically as great an amount as did all the other Canadian Provinces combined.

COAL.

The producing collieries of the Province are located on Vancouver Island and on the western slope of the Rockies, near Crow's Nest Pass, in the extreme south-eastern portion of the Province. The former are operated by two companies, the Western Fuel Co., at Nanaimo, and the Wellington Colliery Co., at Ladysmith and Union (Comox), while the eastern collieries are all operated by one company, the Crow's Nest Pass Coal Co. The conditions surrounding these two coal fields are so different that they must be considered separately.

The gross output of coal from the mines was 1,685,698 tons, of which 1,071,337 tons were sold as coal, 159,651 tons were used under companies' boilers, etc., 432,070 tons were used in making coke, and 22,640 tons were added to stock piles. The amount of coke produced was 238,428 tons, of which 229,618 tons were sold, and 8,810 added to stock.

The Vancouver Island Collieries mined 1,023,013 tons of coal, which was disposed of as follows:—

Sold as coal	784,169	tons.
Used by company	135,034	"
Used to make coke	81,170	"
Added to stock	22,640	"
	1,023,013	"

The coke produced amounted to 19,371 tons, of which 12,934 tons were sold, and 6,647 tons were added to stock.

Of the coal sold, 53 per cent. was exported to the United States, practically all to California, while 20 per cent. of the coke sold found the same market. The local market is slow of growth, so the export market must be looked to for any expansion of business. In 1902, 75 per cent. of Vancouver Island coal went to California, in 1903 about 45 per cent., and in 1904 about 53 per cent., which would indicate that the worst is already known of the competition of the California fuel oil.

The two companies have "pooled" their California sales under one selling agent, which should steady the trade.

The local Coast market in 1904 consumed some 13,000 tons more coal, but about 9,000 tons less coke, than in the preceding year.

The Crow's Nest Pass Coal Co. at its three collieries, Michel, Coal Creek and Carbonado, mined in 1904 662,685 tons of coal, of which there was sold as coal 287,168 tons, and of this 168,980 tons was consumed in Canada and 118,188 tons exported to United States. Of the remainder of the output, 24,617 tons were consumed by the operations of the Company and 350,000 tons converted into coke, of which there was produced 218,857 tons, and of this 119,004 tons was consumed by British Columbia smelters, and 97,690 tons exported to United States.

The distance of these mines from the Coast has as yet prevented any but the interior markets being available, and as three new coal companies have this past year begun shipping from mines just outside of British Columbia, in Alberta, these companies have shared the market with the C. N. P. Coal Co., with the result that these British Columbia mines show this year a decrease in coal sold of 32,791 tons, which is, however, more than made up for by an increase of 66,930 tons in the coke sales.

The consumption of coke from these mines by British Columbia smelters has remained at about the same amount as last year, but the export of coke has increased from 27,758 tons in 1903 to 97,690 tons in 1904, chiefly by the opening up of markets in Montana through the completion of the branch of the Great Northern Railway into Morrissey. The Company's ovens have not been run at full capacity, nor all the time, so that the limit of the present available market seems to have been reached, but there is every indication that it will be held during the coming year.

The following Table indicates the markets in which the coal and coke output of the Province was sold:—

COAL.	Coast.	Crow's Nest Pass.	Total.
Sold for consumption in Canada..................(Tons—2,240 lbs.)	368,764	168,980	537,744
" export to United States.............. "	414,248	118,188	532,436
" " other countries........... "	1,157	....	1,157
	784,169	287,168	1,071,337
COKE.			
Sold for consumption in Canada.............. "	10,333	119,004	129,337
" export to United States.............. "	2,591	97,690	100,281
" " other countries............ "	....	....	....
	12,924	216,694	229,618

GOLD.

Placer Gold.

The placer gold mining industry of the Province this past year produced $1,115,300 in gold, an increase of about 5 % over the preceding year, thanks to a successful season in the Atlin camp. In this camp, gauged by the royalties paid in, the "individual" miners produced in 1904 about 45 % of the product of the camp, while in 1903 the individual miner paid 75 % of the royalty, the change indicating the replacement of individual by company work, even in this camp. The output of the camp was about $530,000, an increase of 20 % over the preceding year, a most encouraging showing, especially as the dredge, from which so much was expected, failed mechanically to handle the dirt. The two hydraulic companies which started up last summer made very creditable productions and promise to do better next year.

In the Dease Lake District the output this year was only about one-third of what it was the previous year, as the most important property in the camp did not produce this past season, being engaged exclusively in installing a new and larger plant.

In the Cariboo District the placer output was almost exactly the same as last year, the Barkerville camp being just the same, while a deficit in the Omineca section was just about balanced by an increased production in the Quesnel Forks section, where the Consolidated Cariboo Company, although only having water to sluice 88 days, produced $90,000 of gold.

In the Fraser river section, placer mining is chiefly carried on on the river bars at extreme low water, the results this year have been very disappointing, as the usual very low water did not occur, since the winter's snow starting to go very early went gradually, with no extremes of high or low water, so these bars could not be worked to the usual extent.

Hydraulic Gold Mining.

The company operating in this manner on the largest scale is the Consolidated Cariboo, which, as already noted, produced $1,000 a day while able to work with a head of water. It has been amply illustrated that the water supply is the measure of the output, and that to increase the latter must be done by first increasing the former. This, the company has decided to do, and will, this coming year, expend a large amount for further ditches and water. There have been operated in Atlin two very successful small hydraulic enterprises, and near Barkerville about the same number, which have paid very well this past season.

Dredging for Gold.

Dredging for gold has not, as yet, been a commercial success, despite all attempts to solve this problem. The difficulties are mechanical, but, therefore, none the less difficult to surmount. Many of the propositions which have been started have had ground sufficiently rich to pay very handsomely, if the conditions were right—that is, freedom from boulders or hard clay cement, a dredgible bedrock, and the gold not in too fine a state of division. The dredge in Atlin attempted to handle dirt that proved too tough for it, and from reports it would appear that the Lillooet dredge was too weakly constructed to stand the work, and the constant stoppages for repairs interfered with what promised to be a very successful run.

Steam Shovels.

As yet the only attempt made in this Province to work a placer gold-property with a steam shovel was in Fort Steele Mining Division, and described in the Report for 1903. The conditions there were scarcely favourable and the shovel was not equipped with an auxiliary elevator to take the gravel from the shovel to the sluice, which appears to be a requisite. This was to have been provided for this shovel but is not yet in place, and the machine has not been worked this past season.

Preparations have been made for the placing of one, or more, steam shovels on ground in the Atlin district this coming summer, notably by the British America Dredging Co., on its leases at Tar Flat; and the Northern Mines, Limited (of Vancouver), on ground recently acquired on Spruce creek. In both these cases the character of the ground and its gold contents have been thoroughly and satisfactorily tested by individual workers, although the top burden was so deep as to prevent any profit being made from this class of work, but the ground appears admirably suited for working by mechanical means.

Gold from Lode. Mining.

The greater part of the gold obtained from lode mining in British Columbia is found in connection with other metals and only separated or collected by smelting, probably not 5 % of the product being obtained from stamp mills. The lode gold product for 1904 was $4,589,608, and was $223,008 less than in 1903, due to the diminished output of the Rossland and Nelson districts. In the former district the tonnage of ore mined is about 5 % less and the gold contents about 8 % less than last year. In the Nelson Mining Division there has been less ore mined and the values per ton were, on the average, lower. In the Bonndary District the tonnage of ore mined has increased about 30 %, and the gross gold contents is this year about 10 % greater than it was the previous year. In the Coast District the tonnage of gold-bearing ore has been 20 % less than the previous year, yet, for all that, the gold contents show an increase of about 8 %.

SILVER AND LEAD.

It has been customary in these Reports to consider silver and lead together, since in this Province about 80 % of the silver produced is obtained from silver-lead ores, the remaining 20 % being chiefly found associated with copper.

The total silver production for the past year was 3,222,481 ounces, valued at $1,719,516. About 50 % of this production came from the Slocan District, and about 25 % from Fort Steele District, the two lead-producing centres, while the other 25 % was produced in all the other parts of the Province. This output is 226,277 ounces greater than was made in 1903—an increase of about 7 %—and is chiefly attributable to the re-opening of the St. Eugene mine, in East Kootenay, the resumption of work in this mine being the direct result of the bounty on lead mined, offered by the Dominion Government, without which assistance the St. Eugene cannot be profitably operated. In the Fort Steele Mining Division there were mined in 1903 less than 1,000 tons of ore, while in 1904 there were mined 76,895 tons, from which was recovered about two-thirds of the lead output of the Province.

The total lead output was 36,646,244 lbs. of lead, of which 21,071,236 lbs. was produced in East Kootenay, 10,611,227 lbs. in Slocan, and 3,091,648 lbs. in Ainsworth Mining Division.

COPPER.

There has been a further advance made in the production of copper, the output this year being 35,710,128 lbs., valued at $4,578,037, an increase of about 4 % over the preceding year, which makes this output of copper the greatest ever made by the Province.

The product was obtained in the following districts:—

Boundary District	22,066,407	lbs.
Rossland "	7,119,876	"
Coast "	5,960,593	"
Yale-Kamloops "	328,380	"
Nelson "	220,500	"
Various Districts	14,372	"
	35,710,128	"

The average assays of the ores of the various camps, based upon copper recovered, were as follows:—Boundary Camp, 1.38 % copper; Rossland, 1.12 %, and Coast District, 3.68 %.

OTHER MINERALS.

Iron Ore.

There has been no ore mined for iron-making this past year, as the only iron blast furnace on the North-West Coast, that on Puget Sound, has not been operated. Formerly, the lead smelters mined iron ore (magnetite) at Kamloops for fluxing purposes, but this has been discontinued, as ores have been found nearer home which, although not carrying so high a percentage of iron, contained small values in copper, gold or silver, which rendered them more desirable.

Zinc.

Zinc ores have been receiving a great deal of attention during this past year, more particularly those of the Slocan District, but, with the exception of the ore from the *Ivanhoe* mine, Sandon, it could not be learned that any important amount of ore had been sold before the close of the year. In the Slocan District zinc blende occurs with the galena ores, sometimes in considerable quantity, and usually associated with iron carbonates. Most of the concentrating mills have now been equipped so as to separate out a "zinc concentrate" from the jigs and tables. These concentrates will run from 38 to 48 % zinc (as zinc blende), but will carry as impurities, considered from the standpoint of a zinc ore, from 2 to 5 % of lead, as galena, from 5 to 15 % of iron, as pyrite and carbonate, and from 20 to 45 ounces of silver to the ton, with the balance gangue matter, usually highly silicious.

Most of the zinc smelting works which are prepared to buy zinc ores are now using the Belgian furnace, in which the ore is mixed with coal or other reducing agent, placed in a clay retort, the reduced zinc being distilled off and caught in a condenser. Iron and lead are highly objectionable in this process, inasmuch as they flux with and destroy the retorts, adding greatly to the cost of the process. For this reason crude Slocan concentrates have not found a ready market, and to remove these objectionable impurities two "zinc enrichment" plants are under construction, in addition to the Payne mine magnetic separator. It is believed that these impurities can be so removed, to such an extent at least as to render them non-injurious, but the question of the silver still remains to be solved, for, as far as could be observed, it is directly included in, and a part of, the zinc blende, and can not be separated, save by smelting or some other form of disintegration of that mineral.

While this silver cannot be considered as detrimental to the ore as a zinc ore, it is very difficult to separate and save the silver, and but a partial recovery can be made at the best; consequently, the price offered by ore buyers seems very low for the silver contents. For this reason it has so far been found advisable by all the producers to throw as much zinc into the lead concentrates as the lead smelter will accept without a penalty, in which case the producer gets no pay for his zinc, but gets a price for its silver contents which more than recoups him for his loss of zinc. These conditions apply to zinc smelting as it is usually carried on. There are, however, two or three newer processes not very widely known, which are especially adapted to such ores, but operators of these concerns are naturally only prepared to give enough for the ore to outbid the regular zinc smelter. An electric process is being developed in Vancouver which has considerable promise and which can be utilised in small units, and this may help to solve the problem by the local treatment of the concentrates.

The ore from the "Lucky Jim" mine, of the Slocan, is a zinc ore, low in silver, with iron and lead as occasional impurities. About 2,000 tons of this ore were shipped to Kaslo about the end of 1904, but the sales had not been completed by the close of the year.

There are zinc ore properties on Quatsino Sound and also near Vancouver, but so far no shipments have been made and little development has been done.

Platinum.

The production of platinum has this year been confined to Granite creek, in the Similkameen, and this creek produced only 35 ounces, valued at $12 an ounce, recovered from the sluice-boxes in washing for placer gold. As far as can be ascertained, platinum has not as yet been found "in place" in British Columbia, although its occurrence is wide-spread in the gravel of the placer gold deposits throughout the Province.

In the Report of 1902 the occurrence of platinum in considerable quantity was noted at several points on the Quesnel river, Cariboo District. These occurrences were the subject of a special investigation by a representative of an Eastern firm interested in the metals, but with what results has not been learned.

Mr. Hobson, in his report of last year's operations of the Consolidated Cariboo Company, an extract from which will be found on page 41 of this Report, notes the occurrence of platinum, osmiridium, and also of palladium, in the heavy concentrates from his sluice-boxes, and he is preparing to put in a system of undercurrents to collect all of these heavy concentrates.

In the Thibert creek hydraulic workings, platinum has previously been noted, but this company did no sluicing this past season. Mr. Hamfield, the manager, in his report, speaking of work planned for next season, says:—"Since definite measures are to be taken towards the saving of the osmiridium which is known to exist in the deposit to an appreciable amount."

Building Stone.

In a comparatively young country, with lumber as plentiful as it is in British Columbia, the use of stone for building purposes is relatively too expensive, except in the cities, where wooden buildings are prohibited within the fire limits. In the Interior there has been comparatively little stone construction going on, and the quarrying of stone for such purposes cannot be said to exist as an industry. When stone is required, a few men are put to work on one of the innumerable rock exposures simply to quarry out sufficient stone to meet immediate demands.

On the Coast, the three largest cities of the Province have created a market for building stone, and several quarries have been opened up on the islands of the Gulf of Georgia, which afford exceptionally easy opportunities for opening up of quarries, as the rock faces open up right from deep water, permitting of the stones being loaded directly on to boats. Most of these quarries will be found described in the body of this Report, under the heading "Stone Quarries of Coast." The stones quarried are granite, sandstone, and an andesite very much resembling sandstone in appearance. An export market for stone is being slowly but surely established in the American cities on Puget Sound and in California.

Brick.

Red bricks are manufactured in small yards all over the Province, for local consumption, the distribution of brick clay being so general as not to necessitate any large brick-making centre, although very extensive yards are in operation near Vancouver and New Westminster. The manufacture of fire brick has been carried on at Comox, by the Wellington Colliery Co., from fire-clay occurring in connection with the coal seams, and also at Victoria by the B. C. Pottery Co., from clay derived from the same source. This latter company has also entered extensively into the manufacture of drain and sewer pipe, tiles, etc., for which there appears to be a good local market.

Oil Shales.

It was noted in last year's Report that apparently a large deposit of shale carrying oil had been discovered in the Beaver valley, near Harper's Camp, Cariboo. Further samples of this shale and a small flask of oil retorted from it were obtained through Mr. Carew-Gibson, of 150-Mile House. These the Bureau sent to Dr. T. R. Marshall, of London, England, with the request that he turn them over for analysis and report to some chemist who had experience with the oil shales of Great Britain. Dr. Marshall handed these to Mr. Arthur King, whom he considered expert in this matter, and reports as follows:—

"As Mr. Arthur King's report was scarcely detailed enough, with no geological or general references, I have re-written it and signed it myself.

"REPORT ON SAMPLES OF SHALE AND CRUDE OIL FROM NEAR HARPER'S CAMP, CARIBOO DISTRICT, B. C.

"*Examination of Crude Oil.*

"The crude oil was maintained at a temperature of 100° C. until there was a complete separation of the oil from water and soluble constituents. Unfortunately, only about 100 cubic centimetres separated out, which would only yield by fractional distillation, fractions in such small quantities that detailed examination of individual portions would be impossible. A volume of two litres is the smallest practical quantity to operate on. However, in this case, the oil is of very low commercial value for the following reasons:—

"1. The oil is liquid at the ordinary temperature and has a very offensive smell. The fact that it is liquid at the ordinary temperature shows that it does not contain a practical amount of the solid paraffins, which is a very important source of profit. The oils from Central Ohio and Indiana, Kentucky and Kansas fields contain paraffin wax, but the oils generally found in Texas and California contain asphaltum base.

"2. The specific gravity is .972, which denotes that the oil is very dense and is only fit for lubricating purposes. This dense oil is scarcely worth refining, as it would only give about 50 % of finished products and these would have very little market value. A passable oil should yield about 75 % of finished products.

"For purposes of comparison, it may be stated that a fairly good oil has usually a specific gravity of .890 to .895, usually under .895.

"*Examination of Sample of Shale from Harper's Camp.*

"The shale itself is worthless for commercial purposes, and from the geological point of view must be considered only as an indication that oil shales exist. Further prospecting may result in an oil find or discovery of rich shale, but not having examined the ground personally, it is impossible to venture an opinion. The shale on distillation yielded only a crude product, which floated on the aqueous portion and represented only 3 % of the weight of the shale. A shale, to be of commercial value, should yield not less than 8 % of crude oil.

"In Colorado and Utah there are extensive strata of silt now hardened to shale, yielding by distillation about 20 gallons of crude oil per ton of shale. The time may come when these immense deposits may have commercial value.

"In conclusion, I may say that neither of the samples have commercial value, but must be considered only in the light of valuable local indications. It may be that locally the more volatile constituents have evaporated into the air, and that shale and oil from more deep seated sources will prove of value. Whether or not a valuable find may be discovered can be determined only by careful geological examination of the district, in conjunction with actual prospecting."

Within the past few months Mr. R. H. Alexander, of Kamloops, writing from Lytton, sent to the Bureau for examination a sample of black shale, which proved to be oil-bearing and very similar to those of Harper's Camp. As was noted in last year's Report, shales of a similar character were found in Calder creek, a tributary of the Flathead. As far as can be learned, no actual development took place in the Flathead oil district during 1904.

GENERAL DEVELOPMENTS OF THE YEAR.

The year 1904 has been devoid of any sensational features in the way of new discoveries or remarkable development, but the year has brought increased output from the well-known mines rather than the opening up of new producing properties.

In the Boundary District the tonnage of ore mined has increased 15 %, and this has called for increased equipment on the part of all the large companies owning their own smelting plants. These, realising that the oxidised ores found in the upper portions of the original ore-bodies were liable to be replaced at a greater depth by sulphides, have "taken time by the forelock" and secured, by means of purchase or consolidation, all available deposits carrying oxidized iron in excess, securing thereby a supply of such ore for fluxing purposes.

The average contents of the ore mined in the Boundary for the past year was 1.38 % copper, $1.44 in gold, and 0.3 oz. in silver, to the ton, based upon the statistics of the district. To mine and smelt in British Columbia an ore of this grade at a profit, it must be done on a very large scale and with the best appliances, and the ores must be self-fluxing or nearly so. That a profit has been made argues that all these conditions have existed, and, further, that the plants have been most economically run.

The company operating upon the largest scale in the district is the Granby Consolidated Mining, Smelting and Power Co. The control of this company recently passed into the hands of New York capitalists, and under the new directorate still further additions have been made to both the mine and smelter plants, while additional railway facilities have been acquired through an extension of the tracks of the Great Northern Railway Co.'s system. From the company's *Old Ironsides* and *Knob Hill* there were mined over 544,000 tons, while the company has been operating several other properties under bond and on shares, for the purpose of obtaining their fluxing or oxidized ores.

The B. C. Copper Co. has made important improvements at the mine, and as most of the ore is now being quarried, the company will be able to even further reduce the cost of mining. The mine produced last year about 175,000 tons of ore, and this output should be materially increased next year. The company acquired a three-quarter interest in the *Emma* mine which last year shipped over 36,000 tons of iron ore carrying small values, and used as flux by this company and by the Nelson Smelter, which owns the other quarter interest in the mine. The company's smelter treated during the year, including customs ore, etc., some 210,484 tons of ore, containing 36,403 oz. of gold, 118,419 oz. of silver and 5,081,743 fbs. of copper.

The Montreal and Boston Co. has been re-organised and consolidated with the *Brooklyn-Stemwinder*, *Rawhide*, *Athelstan-Jackpot*, *Sunset* and *Morrison* mines, thereby insuring a large and steady supply of ore, which it will be possible so to adjust as to make a self-fluxing mixture, an arrangement which should be of great benefit to all the parties of the consolidation.

In the vicinity of Greenwood there are four small high-grade properties which have been developed and have produced several hundred tons of ore, running from $50 to $75 in gold and silver, for which a ready market is found at the local smelters. More attention has been given of late to this class of small high-grade deposit, and with very promising results.

The general costs of mining and smelting in the Boundary District have been reduced to a figure lower than hoped for, and now compare favourably with any work done elsewhere.

In the Rossland Camp the year has been to a certain extent unsatisfactory, from the standpoint of production. It has been a period of experimenting with methods of concentration, which, as pointed out last year, has become a necessity, since, as a greater depth is reached, large bodies are found of lower-grade ore, requiring treatment by concentration.

The Rossland Power Co.'s Concentrator, located between Rossland and Trail, has been completed. This plant was erected to treat *War Eagle* and *Centre Star* ores, and several thousand tons of ore from these mines were sent to the mill for concentration, but, after a trial run of several weeks, the mill closed down early in December, for the purpose of making some changes in the plant, found necessary by experiment.

The LeRoi No. 2 mill, described fully in last year's Report—a combination of hydraulic concentration and "Elmore process" oil concentration—has been working all year, but it is recently reported that the Elmore process has been temporarily discontinued.

The Consolidated White Bear Mining Co. has, during the past year, erected an "Elmore plant" much larger than that of the Le Roi No. 2, and equipped with labour-saving devices which it is believed will materially reduce the cost of operation. This plant was started up only late in the year and definite results cannot yet be expected.

The Velvet-Portland Co., on Sophie mountain, has erected a small hydraulic concentrator, to see what can be done with the ores of that mine.

It will be seen, therefore, that the efforts to arrive at a method of concentration are general throughout the camp, and, from all reports, have been so far successful. If only a portion of the product of the camp is concentrated, the iron-copper sulphides thus obtained would materially assist in fluxing the excess silica in the unconcentrated ores, thereby further reducing the cost of the subsequent smelting. Much importance is attached to these experiments, as their success will materially affect the future of the Rossland camp.

In the Slocan district the most important feature to be observed in connection with mining was the effect that the lead bounty would have in stimulating lead mining, and it must be admitted that, as far as increasing actual production is concerned, the results have not been so great as was anticipated. There has been an increased amount of development going on, which seems attributable to the "bounty," the effect of which will be felt later.

The utilisation of the zinc-blende recovered as a bye-product in the concentration of galena ores has had a great effect on the prosperity of many of the mines and, as the cleaner separation of the zinc concentrates has been accomplished, a profitable market seems assured for the product in the future.

Nothing requiring special note has occurred in the Nelson Division this past year, unless it be the successful prospecting done on Summit creek, in the eastern part of the division—noted in the body of this Report—and the opening up and equipping of the *May* and *Jennie*, a large, low-grade gold property in the western part of the division.

The development in the *Ymir* mine has not been successful. The *Silver King*, operated under contract, did very well on a small scale, and will be worked next year jointly by the company and the contractor.

The *Hunter V.*, a new company, has been most successful and has cleared more than expenses this first year.

In the East Kootenay district there are two or three companies installing plants to work, by mechanical means, placer ground in the immediate vicinity of ground formerly worked by individual miners. These enterprises have not as yet progressed far enough to have obtained definite results. In this district the effect of the "lead bounty" has been most beneficial, and may be said to be directly responsible for the production of 21,000,000 pounds of lead and 600,000 oz. of silver, which could not have been produced without it, while the product for 1905 promises to be at least 50 per cent. greater.

The coal mines are the important factors in the production of this district, and are described elsewhere in the Report; their output has greatly increased, and chiefly through the export of the products. Prospecting has developed further coal fields in this section, farther up the Elk river than the present mines, the general situation being, as described by one of the prospectors—"There is coal to burn in East Kootenay."

In the Windermere district mining has been very much at a standstill, as it is there firmly believed that the Kootenay Central Railway will soon be built, and as this would revolutionise mining conditions, present work has been largely confined to development.

In the Atlin district there has been a more than usually successful placer mining season. The work has been confined to the known field, chiefly in developing the "old channel," and installing plants to take the place of individual workings. The district is fully described by the Provincial Mineralogist in the body of this Report.

In the Liard division productive mining has been practically dormant, owing to the principal companies being fully occupied in enlarging their plants, a serious undertaking in a district so devoid of transportation facilities.

In the Skeena division, as anticipated last year, the settlement of the Alaskan Boundary has led to the active development of several high-grade gold properties, which have considerable promise. No market has, as yet, materialised for the sulphur ores of the mines on the Ecstall river, and these properties have lain idle.

The coal fields of Queen Charlotte islands have been the subject of serious negotiations this past season, but, as far as can be learned, no further development of the properties has taken place, and the drilling to prove the coal nearer the centre of the field has not yet begun.

On Princess Royal island the *Princess Royal Group* shipped 300 tons of ore, running over $50 in gold to the ton, with a little silver and copper, and two other companies are actively developing, with a prospect of shipping in the near future.

In the Telkwa valley the development of what promises to be important deposits of semi-anthracite coal has attracted much attention, while in the same section prospecting has disclosed mineral properties from which some exceptionally fine samples of copper ores have been brought out.

As this district is supposed to be on the line of the approaching Grand Trunk Pacific Railway, it will, this coming season, be pretty thoroughly investigated by prospectors and those in search of land.

On Texada island, in the Nanaimo District, the *Marble Bay* mine has been continuously worked and has made a large output. The *Van Anda* mines have been under bond to an English syndicate, which has been seriously hunting for extensions of the old ore-bodies, but with indifferent success, as the syndicate is about to suspend operations and turn the properties over to the original company. The iron mines have not shipped or been worked this past year.

In the New Westminster Division, the copper properties on Howe Sound, owned by the Britannia Copper Syndicate, have been equipped with a tramway and accessories and a most extensive concentrating plant, which is now approaching completion, should be ready to operate by the middle of the coming summer.

On the West Coast of Vancouver Island there are no new developments to report. The copper properties at Yreka, on Quatsino Sound, have lain idle. In the same vicinity several new claims have been developed but are not yet producing; among these is a zinc blende property. At Sidney inlet the *Prince Group* has lain idle. The *Indian Chief Group* shipped a small quantity of ore, but later was also idle.

In the Mount Sicker District, on Vancouver Island, the Tyee Company has had a successful year as far as shipments is concerned, but has experienced a cave in the mine which retarded operations, and has not as yet been successful in the search for ore below the 300-foot level.

The adjoining property, the *Richard III.*, has been unable to find a further ore lens than the one first struck.

The *Lenora* has been the subject of negotiations on the part of the receiver, which are not yet completed. No work has been done at the mine.

A small copper property has been opened up a few miles from Ladysmith, and is now shipping very fair ore. On some four or five properties development has been satisfactory, and it is probable some of them will ship this coming year.

The Camp McKinney mines have stopped for an indefinite period, and at Fairview the *Stemwinder* mined and milled about 1,200 tons of $4 to $5 gold quartz.

At Hedley City, in the Osoyoos Division, the *Nickel Plate* mine having completed its system of tramways and mill, mined and treated about 10,000 tons of ore, yielding values of from $12 to $15 a ton, chiefly in gold. Other properties in the vicinity are being developed very successfully, and will undoubtedly ship as soon as a railway is built into the district.

At Summit camp—near the summit of the Hope mountains—in the western part of the Similkameen Division, development has been carried on on a number of claims, with results which have attracted much attention to the camp. This coming season will probably bring to two or three of these sufficient "ore in sight" to justify some means of transportation being provided.

In the Nicola district continued development is reported as having been carried on on the mineral properties of the Aspen Grove camp, and in the other claims of the district.

The coal fields near Nicola have, this past year, received a great deal of attention and prospecting, with the result that the field has been found to extend beyond the limits formerly supposed to bound it. As yet the development is superficial, but the quality of the coal is even better than was expected. The following analyses by the Provincial Government Assay Office, from samples brought in by Mr. Alex. Faulds—late manager for Wellington Colliery Company—from one of the properties examined by him, gives an idea of the quality of the coal found:—

NICOLA VALLEY COALS.

Analysis of Coal made for Mr. Alex. Faulds.

	Moisture.	Ash.	Fixed Carbon.	Volatile matter.	Coking qualities.
No. 1.—From upper bench in tunnel or coal gulch.	4.5	9.3	55.5	30.7	Coke not very firm.
No. 2.—Middle bench in tunnel, 120 feet in	5.38	3.6	61.2	29.82	Firm coke.
No. 3.—Bottom bench in tunnel seam in coal gulch	4.46	5.9	59.2	29.44	Firm coke.
No. 4.—Upper bench from Rat Hole	2.99	7.7	63.9	25.41	Firm coke.
No. 5.—From bench from Rat Hole, 50 feet in....	2.85	12.28	61.06	23.81	Firm coke.

SMELTING AND REFINING WORKS.

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Coast.

The *Tyee Smelter*, at Ladysmith, V. I., is the only smelter in operation on the Coast. It is provided with one copper matting furnace of a capacity of about 300 tons a day, and has been making a matte running from 40 to 50 % copper, which matte is sent to Tacoma for refining. This smelter, being unable to secure sufficient ore, has been able to run only about 20 days in the month. The smelter buys all custom ores offering.

The Crofton smelter, at Crofton, V. I., owned by the Northwestern Smelting and Refining Co., has been idle for a couple of years through lack of ore supplies. The plant consists of one large rectangular copper matting furnace, a small circular remelting furnace and a Garretson blast furnace; also a "trough" converter plant. The capacity of the plant is from 500 to 600 tons of ore a day.

There are also on the Coast, and competing for coast ores, a smelter at Tacoma, Wash., U. S. A., equipped with both lead and copper smelting and refining plants; at Everett, Wash., a lead smelting plant; and on Prince of Wales Island, Alaska, a copper smelting plant has recently been erected, but has been unable to start through lack of ore.

Boundary District.

At Grand Forks the Granby Co. has a large and "up-to-date" copper smelting and bessemerizing plant, which treated this past year about 600,000 tons of ore.

At Greenwood the B. C. Copper Co. has a large copper plant of same character, which treated 210,000 tons of ore during 1904.

At Boundary Falls, a few miles south of Greenwood, the Montreal & Boston Copper Co. has at present a large copper matting plant, and is preparing to install a bessemerising plant.

These three companies all purchase custom ores, and as they are all extending their plants they are quite able to handle all ores offering.

West Kootenay.

At Trail, the Canadian Smelting Works, connected with the Canadian Pacific Railway Co., conducts both a copper and a lead custom smelter, to which have been added, within the past couple of years, a lead refining plant and a lead sheet and pipe manufacturing plant. This is the only refining plant of any kind in the Province.

At Nelson, the Hall Mining & Smelting Co. conducts a copper and lead custom smelting works.

These two plants are capable of handling easily all the lead and copper ores offering in the Kootenays.

At Pilot Bay, on Kootenay Lake, the Pilot Bay Smelter, a lead smelting plant, has remained idle for about eight years.

A small blast furnace for lead ores was erected at Ferguson, in the Trout Lake Division, but it has never made an output.

East Kootenay.

In Marysville, Fort Steele Mining Division, the Sullivan Mining Co. has just completed a one-stack lead-smelting plant, to treat the ores from its own mines, which are too low-grade to admit of transportation to Nelson or Trail.

BUREAU OF MINES.

WORK OF THE YEAR.

The work of the Bureau of Mines increases, of necessity, year by year, and this growing activity is due to the following causes:—The extension of the mining area of the Province, with the proportional increase in the number of mines; the increasing desire of the outside public for the free information which the Bureau supplies with regard to the various mining districts and camps; and the appreciation by the prospector of the fact that he may obtain, gratis, a determination of any rock or mineral which he may send to the Bureau.

The routine work of the office, beginning with the preparation and publication of the Report for the year just ended, followed by the examination in the field of as many of the mines and mining districts as the season would permit, together with the work of the Laboratory and the instruction of students, fully occupied the staff for the year. The staff of the Bureau consists of the Provincial Mineralogist, the Provincial Assayer, and a junior assistant in the Laboratory, with the temporary assistance of a clerk during the publication of the Report. In connection with inquiries for information and the collection of statistics, about 1,700 letters were sent out, with approximately the same number received.

In addition to the work performed in the office, the Provincial Mineralogist this last year spent 160 days in the field examining various mining districts, taking notes to be later written up for publication, while the Provincial Assayer was in the field for 40 days, making a special examination, with a view to a report, of the stone quarries of the coast, and examining mining properties in the New Westminster and Yale Districts.

Provincial Mineralogist.

The Provincial Mineralogist left Victoria for his summer's work in the field, on June 10th, proceeding direct to Nelson, where ten days were spent attending the trial of the Crow's Nest Pass Coal Co., with respect to the explosion of May, 1902, listening to the evidence of the eminent coal mining experts from England, the United States, and elsewhere.

On June 23rd the Ymir District was visited, as were most of the producing and many of the non-producing camps of the Nelson Mining Division.

Later, the Ainsworth Mining Division was visited and a special inspection and report made of Hamill creek.

On July 26th the Provincial Mineralogist started on a tour of inspection of the Slocan City and Slocan Mining Divisions, which work occupied him until September 7th, when a hurried trip was made to the lead mines of East Kootenay, in the vicinity of Cranbrook.

On September the 14th, in response to a telegram from the Department, a special trip to, and report on, Woodbury creek in the Ainsworth Mining Division was made.

Returning to Victoria on September 21st, after a stay of four days, the Provincial Mineralogist left on September 26th for Atlin, by the steamer "Princess May," returning to Victoria on October 26th, and leaving again on October 30th for Howe sound, returning to Victoria on November 3rd.

On November 22nd he was ordered to proceed to Morrissey, to investigate an outburst of gas in that colliery, whereby 14 men were suffocated; from whence he returned to Victoria on December 5th.

From December 5th to 10th an examination for Assayers' Certificates of Competency, under the "Bureau of Mines Act," was held in the Government Laboratory, at which the Provincial Mineralogist and the Provincial Assayer, together with Mr. Harris, of the Hall Mines Smelter, Nelson, were the examiners.

After that date, the Provincial Mineralogist began and was occupied in the preparation for publication of the notes taken in the field, the collection and preparation of statistics for the year, and the routine work of the office.

ASSAY OFFICE.

The following is a summary of the work of the Assay Office of the Bureau for the year 1904, as reported by the Provincial Assayer, Mr. Herbert Carmichael:—

During the year 1904, there were made by the staff in the Government Assay Office, 1,099 assays or quantitative determinations, which is an increase of 379 over the number made during the previous year. Of these, a number were for the Bureau of Mines, or for the Department, for which no fees were received. The fees collected by the office were as follows:—

Fees from assays and chemical determinations	$ 234 00
" melting and assaying gold dust and bullion	218 00
" assayers' examinations	450 00
Total cash receipts	$902 00
Determinations and examinations made for other Government Departments for which no fees were collected	$200 00
Value of assaying done	$1,102 00

Free Determinations.

In addition to the above quantitative work, a large number of qualitative determinations or tests were made in connection with the identification and classification of rocks or minerals sent to the Bureau for a report. Of these no count was kept, nor were fees charged therefor, as it is the established custom of the Bureau to examine and test qualitatively without charge samples of mineral sent in from any part of the Province, and to give a report on the same. This has been done for the purpose of encouraging the search for new or rare minerals and ores, and to assist prospectors and others in the discovering of new mining districts, by enabling them to have determined, free of cost, the nature and probable value of any rock they may come across. In making these free determinations, the Bureau asks that the locality from which the sample was obtained be given by the sender, so that the distribution of mineral over the Province may be put on record.

Purchase of Gold Dust by Government.

The Provincial Government has undertaken to purchase any gold dust which may be presented at the Treasury, and to pay therefor within 24 hours, in cash, to the full extent of its assay value, as is done at the United States Mint Assay Office at Seattle and the Dominion Government Assay Office at Vancouver. This enables the miner arriving with gold dust to dispose of it promptly at the highest market price, and as the local banks will always make an advance on a certificate of deposit of dust with the Government, he is enabled also to obtain immediately funds sufficient for his wants. In connection with these purchases, the Assay Office of the Bureau has to melt and assay all lots of gold dust presented. The assaying is done by two assayers working independently, whose results must check, thus preventing error and assuring to the depositor full returns for his dust.

It is interesting to note that advantage is being taken of this provision, and that the number of such depositors is increasing. The number of separate lots of gold dust brought in for melting and assay in 1904 was 171, an increase over last year, having a total value of $103,693, as against $152,675 in 1903, indicating that the office is being more used by the small operator or individual miner.

Special Analyses.

In addition to the regular routine of the laboratory, a number of special analyses have been made, and among these may be mentioned a series of analyses of samples of coal taken from the new shaft being sunk at Cumberland, and samples from the new coal field being developed in the Nicola Valley. The results of these analyses are given elsewhere in the Report. A series of analyses was also made of samples of soil from the alkaline lands occurring in the Okanagan valley, for the purpose of devising some means of rendering them fit for cultivation. This work is being further prosecuted.

There are each year a number of reported finds of rare or unusual minerals from different parts of the Province, which, upon being traced up and investigated, are in most instances found to be incorrect. These misleading reports have been traced, in a number of instances, to faulty methods of chemical examination, or to carelessness on the part of the assayer making the investigation.

As an example of this may be mentioned the repeated reports of finds of nickel from all parts of the country. Since the nickel of Ontario occurs in a pyrrhotite, many specimens of this mineral in British Columbia have also been suspected of carrying nickel, and have been tested for it by methods bound to give misleading results. For example, when much iron and a supposedly small amount of nickel are present in an ore, a method is adopted of separating the iron by a precipitation as a basic acetate. This effects only a partial separation of the iron, some of which goes through the filter into the solution supposed to carry the nickel, and when, to precipitate the nickel, the re-agent is added to this solution, a precipitate is produced which is deemed to be nickel, when in reality it is only iron which has escaped the previous imperfect separation.

Or again, in the precipitation of the nickel as a hydrated oxide, even if other metals have been carefully removed, the use of chemicals rendered impure by the presence of alumina, will result in the precipitation of a hydrate of alumina which may very readily be mistaken for nickel.

Tin, bismuth and tellurium have also been reported where they did not exist; while copper assays, vitiated by the presence of molybdenum, are quite common.

A standard chemical method for the determination and separation of molybdenum is in course of preparation in the laboratory, and it is hoped will be prepared for publication at no distant date.

Instruction to Students.

A course of instruction in assaying and blowpipe mineralogy is given each year in the laboratory to such students as may apply. This past year five students have been taking the course. Several students who in former years have taken the course are now occupying important positions as assayers at mines and smelters.

The Mineral Museum of the Bureau contains a large collection of the ores of the Province, which, through additions made to it year by year, is gradually becoming very complete, although as yet the districts of Lillooet, Arrow Lake and Lardeau are poorly represented. These collections have been found of material use to the students mentioned, and to others, who spend much time in studying them.

TAMIHY MOUNTAIN, SLESSE CREEK, NEW WESTMINSTER, M. D.
(On International Boundary.)

EXAMINATIONS FOR ASSAYERS.

REPORT OF H. CARMICHAEL, SECRETARY OF BOARD OF EXAMINERS.

I have the honour to submit, as Secretary, the Annual Report of the Board of Examiners for Certificates of Competency and Licence to Practise Assaying in British Columbia, as established under the "Bureau of Mines Act Amendment Act, 1899."

The Act requires that at least two examinations shall be held each year, and such have duly taken place. The first took place at Nelson, in the laboratory of the Hall Mining and Smelting Co., kindly loaned for the purpose, beginning on May 9th, 1904, at which eight candidates presented themselves for examination, of which number two succeeded in passing the required examination, and it was duly recommended to the Minister of Mines that Certificates be issued to them.

The second examination was held in Victoria in the Government Laboratory, beginning on December 5th, 1904, at which four candidates were examined, but all of these failed to reach the standard required.

In addition to the two above mentioned, the Board, during the year, recommended the granting of eight certificates under section 2, sub-section 2, of the Act, all of which Certificates have been duly issued by the Minister of Mines in compliance with such recommendation.

The following is a list, up to December 31, 1904, of those to whom Certificates of Competency have been issued:—

LIST OF ASSAYERS HOLDING PROVINCIAL CERTIFICATES OF EFFICIENCY UNDER THE "BUREAU OF MINES ACT AMENDMENT ACT, 1899."

(Only the holders of such certificates may practise assaying in British Columbia.)

Under section 2, sub-section (1).

Austin, John W	
Ayres, E. A	Trail.
Baker, C. S. H	
Barke, A. C	
Bishop, Walter	Grand Forks.
Buchanan, James	Trail.
Campbell, Colin	New Denver.
Carmichael, Norman	Ainsworth.
Church, George B	
Clarke, Roy H	Spokane, Wash.
Cobeldick, W. M	
Comrie, George H	Rossland.
Collinson, H	Ladysmith.
Crerar, George	Boundary Falls.
Cruickshank, G	Rossland.
Davis, A. B. C	
Day, Athelstan	Duncans.
Dedolph, Ed	Nelson.
Dockrill, Walter R	Vancouver.
Farquhar, J. B	Vancouver.
Gooding, L. E	Bingham, Utah, U.S.
Haseltine, R. S	Idaho.
Hawkins, Francis	Sandon.
Hurter, C. S	Ladysmith.
John, D	Ferguson.
Kitto, Geoffrey B	Mount Sicker.
Lang, J. G	Greenwood.
Ley, Richard N	Nelson.
Marsh, Richard	Rossland.
Marshall, William S	Ladysmith.
Mitchell, Charles T	Grand Forks.
McFarlane, James A	Ferguson.
Nicholls, Frank	Nelson.
Nicholson, Charles F	
O'Sullivan, John	Vancouver.
Perkins, Walter G	Basin, Montana, U. S.
Pickard, T. D	Hedley.
Robertson, T. R	
Rombauer, A. B	Butte, Montana.
Segsworth, Walter	
Sim, Charles John	
Snyder, Blanchard M	Grand Forks.
Sundberg, Gustave	Prince of Wales Isd.
Tally, Robert E	Spokane, Wash.
Thomas, Percival W	Rossland.
Tretheway, John H	
Turner, H. A	Boundary Falls.
Vance, John F. C. B	Vancouver.
Vans Agnew, Frank	Siberia.
Wales, Roland T	
Watson, William J	Ladysmith.
Welch, J. Cuthbert	Boundary Falls.
Whittaker, Dalbert E	Victoria.
Widdowson, E. Walter	Ymir.
Williams, W. A	Grand Forks.

LIST OF ASSAYERS HOLDING CERTIFICATES OF EFFICIENCY.—*Concluded.*

Under section 2, sub-section (2).

Archer, Allan	Ymir.
Bryant, Cecil M	Vancouver.
Blaylock, Selwyn G	Trail.
Cavers, Thomas W	
Clothier, George A	Moyie.
Cole, Arthur A	Rossland.
Coulthard, R. W	Fernie.
Cowans, Frederick	Vancouver.
Dixon, Howard A	Toronto, Ontario.
Galbraith, M. T	
Gilman, Ellis P	Vancouver.
Green, J. T. Raoul	Blairmore.
Guess, George A	Trail.
Gwillim, J. C	Kingston, Ontario.
Heal, John H	
Hilliary, G. M	Idaho, U. S.
Holdich, Augustus H	
Johnston, William Steele	
Kaye, Alexander	Rossland.
Lay, Douglas	McGuigan.
Lewis, Francis B	
Merrit, Charles P	
Musgrave, William N	
Mussen, Horace W	Siberia.
McArthur, Reginald E	
McFarlane, James	Australia.
McLellan, John	Camborne.
McMurtry, Gordon O	Rossland.
McNab, J. A	Trail.
McVicar, John	
Maclennan, F. W	Rossland.
Noble, David T	Trail.
Outhett, Christopher	Kamloops.
Shannon, S	Ferguson.
Stevens, F. G	Mexico.
Sullivan, Michael H	Trail.
Thomson, H. Nellis	Anaconda, Montana.
Turnbull, John M	Trail.
Twinning, Leslie A. C	Ferguson.
Watson, A. A	Vernon.
Watson, Henry	
Wright, Richard	Rossland.
Wynne, Lewellyn C	Rossland.

Under section 2, sub-section (3).

Carmichael, Herbert (Provincial Assayer).	Victoria.
Harris, Henry (Asst. Supt. Smelter.)	Nelson.
Kiddie, T. (Supt. Smelter)	Ladysmith.
Sutton, W. J	Victoria.
McKillop, Alexander	Nelson.
Pellew-Harvey, Wm	London, England.
Robertson, Wm. F (Provincial Mineralogist).	Victoria.
Marshall, Dr. T. R	London, England.

PREVIOUSLY ISSUED UNDER THE "BUREAU OF MINES ACT, 1897," SECTION 12.

Pinder, W. J. B	Dawson, Y. T.
Thompson, James B	Vancouver.

EXAMINATIONS FOR COAL MINE OFFICIALS.

During the year 1904 the regulations regarding the qualifications and examinations of officials employed in coal mines have been completely revised and at the same time made much more stringent and thorough.

The "Coal Mines Regulation Act" now provides that all officers of a coal mining company having any direct charge of work underground, shall hold Government Certificates of Competency, which are to be obtained only after passing an examination before a duly qualified Board, appointed for the purpose of holding such examinations, and known as the Managers' Board.

The certificates granted on the recommendation of such Board, and the requirements for same, are as follows:—

FIRST CLASS CERTIFICATE (or Manager's Certificate).

Such a certificate must be held by every manager or "chief officer having the control and daily supervision of any coal mine" in British Columbia. The statutory requirements for this certificate, in addition to such examination and qualifications as may be imposed by the Board of Examiners, are, that the candidate for examination shall be at least 25 years of age, a British subject, and have had at least 5 years' experience in or about the practical working of a coal mine.

SECOND CLASS CERTIFICATE (or Overman's Certificate).

Such certificate must be held by any person "who has the daily charge of the underground workings of a coal mine under the control and daily supervision of the manager, and next in charge under such manager."

Aside from the requirements of the Board of Examiners, a candidate for such certificate must have had "at least 5 years' experience in or about the practical working of a coal mine."

THIRD CLASS CERTIFICATE.

This certificate must be held by every shiftboss, fireboss, or shotlighter in a coal mine in British Columbia, and besides the examination by the Board, calls for 3 years' practical experience.

Experience in a coal mine outside of the Province may be accepted by the Board. Any certificate is considered to include that of any lower class.

In addition to the examinations and certificates already specified as coming under the Managers' Board, the Act further provides that every coal miner shall be the holder of a certificate of competency as such. By "miner" is meant "a person employed underground in any coal mine to cut, sheer, break or loosen coal from the solid, whether by hand or machinery."

Examinations for a miner's certificate are held each month at each colliery by a Board of Examiners, known as the Miners' Board, and consisting of an official appointed by the owners, an examiner elected by the miners of that colliery, and an examiner appointed by the Government.

Examinations were held by the Managers' Board, simultaneously at Fernie and Nanaimo, on January 19th to 21st, 1904, under the former regulations, and an examination under the present regulations has been appointed for February, 1905.

The following is the registered list of those to whom Certificates of Competency have been issued by the Managers' Board, the Secretary of which Board is Archibald Dick, Inspector of Mines, Nanaimo:—

FIRST CLASS CERTIFICATES.—SERVICE CERTIFICATES ISSUED UNDER SECTION 39, "COAL MINES REGULATION ACT, 1877."

John Bryden, Victoria.
*James Gillispie.
Edward G. Prior,
Thomas A. Buckley.
*John Dick.
Archibald Dick, Government Inspector of Mines.
James Dunsmuir, Victoria.
James Cairns, Comox, farmer.

CERTIFICATES OF COMPETENCY ISSUED UNDER "COAL MINES REGULATION ACT, 1877."

Name.	Date.		
Shepherd, Francis H.	March	5th,	1881.
Gibson, Richard	〃	5th,	〃
*McGregor, William	〃	5th,	〃
Honobin, William	May	1st,	1882.
*Muir, Archibald	〃	1st,	〃
Little, Francis D	〃	1st,	〃
Martell, Joshua	〃	1st,	〃
*Scott, Robert	〃	1st,	〃
Chandler, William	December	21st,	1883.
Priest, Elijah	〃	21st,	〃
McGregor, James	January	18th,	1888.
Randle, Joseph	〃	18th,	〃
*Dickinson, Urick Evan	〃	8th,	1889.
Matthews, John	〃	8th,	〃
*Jones, John Bunyan Louis	〃	8th,	〃
Norton, Richard Henry	August	26th,	〃
Bryden, Andrew	December	30th,	〃
Russell, Thomas	April	20th,	1891.
Sharp, Alexander	October	27th,	〃
*Lindsay, William Alfred	March	4th,	1892.
Kesley, John	〃	4th,	〃
Wall, William H	May	30th,	1896.
Morgan, Thomas	〃	30th,	〃
Wilson, David	〃	30th,	〃
Smith, Frank B	〃	30th,	〃
*Jamieson, Robert	〃	30th,	〃
Bradshaw, George B	June	12th,	1899.
Simpson, William G	〃	12th,	〃
*Fisher, Robert	November	5th,	〃
Hargreaves, James	February	5th,	1991.
Drinnan, Robert G	〃	5th,	〃
Browitt, Benjamin	August	3rd,	〃
Stockett, Thomas, Jr	〃	3rd,	〃
Pearson, Robert	〃	3rd,	〃
Cunliffe, John	〃	3rd,	〃
*Lamb, Robert B	〃	3rd,	〃
Evans, Daniel	〃	3rd,	〃
McEvoy, James	October	17th,	1902.
Wilson, A. R	〃	17th,	〃
Simister, Charles	〃	17th,	〃
Colville, Andrew	〃	17th,	〃
Budge, Thomas	〃	17th,	〃
Mills, Thomas	〃	17th,	〃
Faulds, Alexander	〃	17th,	〃
Richards, James A	〃	17th,	〃
McLean, Donald	January	21st,	1904.
Wilkinson, Geo	〃	21st,	〃
Wright, H. B	〃	21st,	〃
Coulthard, R. W	〃	21st,	〃
Roaf, J. Richardson	〃	21st,	〃
John, John	〃	21st,	〃
Manley, H. L	〃	21st,	〃

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*Dead.

CARIBOO DISTRICT.

CARIBOO AND QUESNEL MINING DIVISIONS.

Report by John Bowron, Gold Commissioner.

I have the honour to submit for your information my thirtieth annual report upon the mines and mining operations in Cariboo District for the past year.

The phenomenally dry season has been most disastrous to the successful working of our hydraulic mines, by which method three-fourths of the gold yield of the district is at present produced; consequently, the output has been much less than it would have been under normal weather conditions. Although the snowfall of the winter 1903-4 (a source from which most of the hydraulic claims have to depend for their water supply) was fairly good, a warm spell in March caused most of the snow to melt and run off before the hydraulic season had commenced, and the remainder disappeared suddenly in a most extraordinary manner, without creating any freshet whatever, a circumstance quite unprecedented.

I have but little to report in the way of new discoveries of gold; in fact, nothing worthy of note, if I except a reported discovery recently made at Horsefly, the particulars of which I am not at present informed.

A large part of the available labour of the district, of which there has been a visible decrease during the past year, continues to be absorbed in work of construction upon our larger enterprises which have not yet reached the producing stage. The actual commencement of railway construction to our north will doubtless reverse this condition of affairs, and will also, it is generally believed, prove a veritable panacea for all our ills, not alone from the increase in population which it will bring, but more especially from the fact that capitalists, who now decline to take the long and tedious 280-mile stage journey, will, with greater transportation facilities, visit our mines personally, and will doubtless, many of them, be induced to invest, with the result that much of our dormant wealth will be brought to light.

I much regret I am as yet unable to report the extensive works at Slough creek, Willow river and La Fontaine, as having reached the condition of producing mines, but there is certainly a well-founded hope that I shall be able to do so another year; the present status of these mines I shall speak of later.

It will be noted that, notwithstanding the decreased population and the absorption of a very large part of the available labour on non-productive work, not to mention the fact that, by the drought, much time was lost, there has been a small but satisfactory increase in the gold product of the district over that of 1903.

QUESNEL MINING DIVISION.*

In the Quesnel or southern division of the district, notwithstanding the scarcity of water, the Consolidated Cariboo Hydraulic mine produced somewhat more than last year, although having less than one-half the normal water supply. This company now finds it necessary to provide against a similar contingency in the future, by adding to its already extensive ditch systems, upon which, it is understood, a large expenditure is contemplated the coming year. I regret my inability to speak more definitely of the operations of this company, but Manager Hobson regards it as his first duty to report to his company, after which he promises to send in his report, but the same has not yet come to hand.

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*See also Report of Mining Recorder, page 50.

NOTE BY PROVINCIAL MINERALOGIST.—Through the courtesy of Mr. J. B. Hobson, the Provincial Mineralogist has been permitted to make the following extracts from his report to his directors as to the operations during the season 1904:—

"The past season again turned out a most disappointing one, for the reason that the fall precipitation and winter snow failed to afford the quantity of water expected at the opening of the season. The lack of the usual summer precipitation and the heavy evaporation from the reservoir lakes caused by the unusually hot, dry weather that prevailed throughout the summer months, worked a great reduction in the season's water supply, and left only sufficient to operate the mine 88 days and 16 hours—from the 15th of April to the 2nd September—out of a possible season of 212 days.

"Washing gravel from the main bank with water from the reservoir lakes commenced on the 9th May, and continued for a period of 38 days and 19½ hours, ending on the 23rd June. During the progress of the run, $103,389\frac{1}{10}$ miner's inches of water was used to wash out 920,000 cubic yards of top gravel and indurated volcanic mud, from which was recovered 3,425.09 ounces of gold, valued at $58,358.09, an average yield of $6\frac{34}{100}$ cents per cubic yard; the duty attained for the water used being about $8\frac{89}{100}$ cubic yards per miner's inch.

"The second run commenced immediately after the moving of the hydraulic plant and advancement of sluices—on the 16th July,—and continued for a period of 33 days and 16½ hours, ending with the exhaustion of the water supply on the 2nd September. During the progress of the run, 81,500 miner's inches of water was used to wash out 407,817 cubic yards of top gravel and indurated volcanic mud, from which was recovered $1,552\frac{15}{100}$ ounces of gold, valued at $26,508.12, an average yield of $6\frac{5}{10}$ cents per cubic yard; the duty attained for water used being about 5 cubic yards per miner's inch.

"SUMMARY OF THE SEASON'S MINING OPERATIONS.

"Total time occupied in washing in Pit No. 1	88 days, 16 hours.
Total quantity of water used	225,198 miner's inches.
Quantity of top gravel, clay and slide rock washed:	
Winter accumulation of ice and slide rock from rims	120,986 cubic yards.
Gravel from face of bank, Bench No. 3	1,327,817 " "
Bedrock gravel	638 " "
Bedrock cut in N.E. rim for pipe lines	6,700 " "
Bedrock cuts for advancement of sluices	5,200 " "
Total quantity washed	1,461,341 " "
Average duty of water per miner's inch	$6\frac{49}{100}$ " "
Average yield per cubic yard washed	$5\frac{88}{100}$ cents.
Average daily product for water used	$969.27.
Gold product for season	$5,037\frac{89}{100}$ ounces.
Value of gold	$ 85,936 30
Value of gold recovered prior to 1904	1,122,798 36
Total product of mine from 1894 to date	1,208,734 66

The receipts and expenditures attending the operation of the Company's mines for the season will be found distributed in detail in the following statements:—

"OPERATING EXPENSES.

Mining	$30,815 05
Explosives	21,148 20
Sluice maintenance	6,493 09
South Fork ditch maintenance	5,786 34
Morehead ditch maintenance	4,401 72
Camp maintenance, fuel, etc.	1,288 91
Mine and camp light maintenance	605 73
Waggons and harness maintenance	212 67
Telephone maintenance	109 51
Roads and trails	64 47
Stationery and printing	138 13
Postage and telegraph	410 67
Legal expenses	15 00
Lands and leases (lease rentals)	2,048 75
Licence	110 00
Insurance	803 00
Office expenses	1,684 77
Bullion expense (royalty, insurance, etc.)	3,624 50
Management	6,712 41
Stable expense	541 08
Tools and implements (loss for season)	519 03
Horses (loss for season)	400 00
Quicksilver (loss for season)	490 72
Total	$88,423 75

" RECEIPTS.

Gold recovered for season	$85,936 30
Profit on stores sold	3,891 78
Total	$89,828 08 "

As has been previously pointed out in Mr. Hobson's Reports, and by the Provincial Mineralogist in the Report for 1902 (page 81), the bedrock in the pit does not rise at a grade as steep as has been found necessary to run the sluices; consequently, as the pit advanced, the present sluice, which is as low as it can be, eventually arrived at the elevation of the bedrock. This sluice can be extended for a long distance yet to remove the upper benches and top burden, but the lower bench, lying on bedrock, will have to be removed by a shorter sluice system, which Mr. Hobson proposes to make by running a tunnel from the Quesnel river, through the rim-rock, a narrow ridge dividing the ancient and modern channels.

"SLUICE TUNNEL.

"The sluice tunnel required for the second outlet from the mine to the dumps into the South Fork of the Quesnel river, when completed will be 1,200 feet in length; the dimensions of the tunnel are 10 feet by 10 feet in the clear, and large enough to accommodate a sluice 7 feet wide by 3 feet deep, and a walk 2 feet 6 inches wide placed on one side for the sluice tenders. The wet and loose condition of the surface rock on steep side-hill delayed the starting of the work until late in the spring; considerable difficulty was encountered in driving through the loose ground, which required timbering with heavy sets placed 3 feet apart for a distance of 63 feet; when the loose ground was passed, two shifts of miners were set to work with two No. 15 Gardner electric drills, and advanced the tunnel 197 feet in hard rock, making the total distance driven to the close of the season 260 feet, at an average cost of $12 per foot. Better progress was made as the men became more familiar with the use of the electric machines, their duty improving gradually until the advance of tunnel increased from 21 feet to 38 feet per week. At this rate of progress the tunnel can be completed in time for use before the close of the season of 1905.

"It is intended to take up the bed-rock deposits of the 4th bench by hydraulic elevator during the progress of next season's operations, and the high-grade of the deposits, as shown by the working tests made at the close of the season of 1903, which showed an average value of about $1.50 per cubic yard, assures good results from the elevator.

"By reference to the following tabulated statement it will be noted that the gold product is dependent mainly upon copious precipitation and an abundant supply of water:—

"PRODUCT OF MINE SINCE COMPLETION OF WATER SUPPLY SYSTEM IN 1898 COMPARED WITH PRECIPITATION.

Year.	Precipitation in inches.	Water used in miner's inches.	Time Run.	Cubic Yards Gravel Washed.	Product.
1899	$28\frac{65}{100}$	353,056	144 days, 8 hours	1,952,535	$ 92,678 93
1900	$30\frac{67}{100}$	460,878	171 " 13 "	1,843,938	350,085 77
1901	$20\frac{30}{100}$	253,250	104 " 13 "	2,420,288	142,273 41
1902	$23\frac{40}{100}$	179,520	65 " 15 "	690,442	61,395 19
1903	$17\frac{43}{100}$	127,083	53 " 7 "	373,000	44,943 70
1904	$24\frac{30}{100}$	225,198	88 " 16 "	1,461,341	85,936 30

"It is, therefore, evident that dependence upon the precipitation over the area of watershed now under control, is accompanied with too much uncertainty to insure the financial success desired, and that the present water supply system must be extended to a permanent source that will afford an abundant supply of water throughout the open season.

"Since the close of the season of 1903 hydrographic surveys have been made to determine the possibility and cost of increasing the Company's water supply, by the construction of a canal along the westerly slope of the Morehead range, from Morehead lake reservoir, a distance of about 15 miles, to the creek known as Three-Mile creek, as measured from the Beaver lake house, or by the construction of a system of canals and inverted syphons from the Company's mines, a distance of about 17 miles, to Spanish lake, which is situated in the mountains at the head of Spanish creek, a tributary of the North Fork of the Quesnel river.

"WESTERLY SLOPE OF MOREHEAD RANGE.

"*Estimated cost of Canal having capacity for delivering 2,500 miner's inches of water.*

"Ten miles of canal, including flumes, waste-gates, etc., from Morehead lake to 8-Mile creek, at $8,000 per mile	$80,000
Five miles of canal, etc., from 8-Mile creek to 3-Mile creek, at $8,000 per mile	40,000
Timber crib dams at outlet of 3-Mile and 8-Mile lakes, with gates, camp buildings, etc	2,000
Total cost of south-west Morehead Canal	$122,500

"*Estimate of probable cost of Canal and pipe lines required to deliver 2,500 miner's inches of Spanish lake water at the Morehead pooling reservoir.*

"Construction of 15 miles of canal at $9,000 per mile	$ 135,000
2,500 feet of 40" pipe line across Poquette pass at $8 per foot laid	20,000
8,000 feet of 40" pipe crossing the South fork of Quesnel River at $10 per foot laid	80,000
Timber crib and plank-sheathed diversion dam at outlet of lake	10,000
Total estimated cost	$245,000

"A canal and system of pipe lines having a capacity for the delivery of 5,000 miner's inches of water can be constructed at a cost not exceeding $490,000.

"For several years last past, qualitative tests have been made from time to time for the presence of gold, platinum and osmiridium, in the heavy concentrates that remain in the sluices after cleaning up; and while making one of these tests in May, 1903, the presence of palladium was indicated, in addition to platinum and osmiridium. An analysis of a sample of concentrates, made by J. O'Sullivan, F. C. S., Chemist, of Vancouver, in May, 1903, gave large percentages of gold, platinum, palladium and osmiridium, which brought the value of the concentrates up to $3,872.76 per ton. A second sample taken from a pan of concentrates taken from the sluices after the clean-up in September, 1904, was sent to Mr. J. O'Sullivan, Chemist, of Vancouver, and gave the following results:—

	Ozs. per ton.	Gross value per ton of 2,000 lbs.
"Gold	95	$ 1,900 00
Silver	180	90 00
Platinum	64	832 00
Palladium	64.4	1,769 00
Osmiridium	42	1,386 00
Copper	10.5%	16 56
Total value		$5,993 56

"The gold and silver values are, no doubt, included in particles of pyrite and argentiferous galena and partly in small particles of gold covered by manganese and other metallic oxides, and cannot be recovered by the process of amalgamation. The platinum, palladium and osmiridium are found in minute metallic grains and enclosed in small fragments and nuggets of magnetite and chromite, which appear to make up quite a large percentage of the sluice concentrates found after cleaning up.

"What quantity of these high-grade concentrates are included in the deposits, or can be recovered therefrom, cannot be determined until after the completion of the system of undercurrents which is to be placed at the end of the sluice outside the tunnel, where everything of value will be separated from the tailings before going over into the dump and concentrated on the undercurrent tables. These undercurrents will probably be completed and placed in operation before the close of the ensuing season."

KEITHLEY CREEK.

The *Onward* claim, on Keithley creek, owned by Messrs. Veith and Borland, referred to in last year's report, is proving a valuable mine. This is on a hill channel situated on the left side of the creek, about two miles from its mouth. It is 250 feet into the hill, about 75 feet above the present creek, and is a drifting proposition. The discovery of this channel was made two years ago, but encountering so much water as to render the working of the ground difficult and expensive, a great part of the present season has been devoted to the running of a drain tunnel along the rimrock, which in July had been so far advanced as to render it possible to resume work on the pay gravel in the face. On an average, 15 men are employed on this mine, which pays its owners a dividend of from $1,000 to $1,200 per month. Work will be continued during the winter.

SNOWSHOE CREEK.

The *Hayward* hydraulic claim, on Showshoe creek, owned by the same firm, owing to the dry season, worked but 50 feet in length of bedrock by 100 feet in width. About the first of September the water supply gave out entirely, when only two-thirds of the bedrock had been cleaned up; ten men were employed when piping, and five during fhe time of cleaning up bedrock. This claim paid about $1,000 in dividends.

The Luce Company, of which Mr. W. F. Anderson is foreman, working on this creek, employed four men during the time of piping, and worked about three months in all, cleaned out the old ground-sluice, and put in 250 feet of new flume to the face, where pay was left ten years ago, upon which operations will be resumed in the spring. The claim about paid expenses for the season.

THE CARIBOO MINING DIVISION.

Leaving the Quesnel Mining Division upon which it is presumed the Mining Recorder, Mr. Stephenson, will give a more detailed report, and coming to the Cariboo Division, I shall first refer to the mines still operating on Williams creek.

WILLIAMS CREEK.

It is now 44 years since gold was first discovered on this stream, and when we consider that it has been worked continuously every year since, and that for a distance of only two and a half miles, it is surprising to find that within this limit gold is still annually produced in considerable quantity. Although the richer deposits in the deeper bedrock channel have been drifted out long since, and the shallower ground along the side-hill, situated at a sufficient elevation to admit of its washings being deposited into and carried away by the waters of the creek, has been worked by hydraulic process, yet there is an immense body of auriferous gravel as yet untouched, lying between the drifted out bedrock gravel and the surface of the present creek channel. It was this knowledge that induced the Cariboo Gold Fields, Limited, to instal its costly hydraulic lift-plant, which proved a failure (in consequence of the great elevation to which the gravel had to be raised) and their subsequent installation of a system of bucket elevators, which have not hitherto proved an entire success, owing to the wearing of the bearings which support the buckets. The introduction, this season, of chilled steel bearings appears to have solved the problem as to the proper method of raising the gravel from the pit to a sufficient height for its disposal, at a minimum cost. The gravel has been proved to contain high values, quite equal to expectations. Regarding the season's operations the manager, Mr. Bromfield Brough, says :—

"The new chain installed has worked well, with little if any signs of wear. There had been a good snowfall and the gravel to be operated upon showed decided signs of improvement; in fact, everything pointed to a very successful season. Unfortunately, as you are aware, the weather in June and all succeeding summer months proved to be abnormally dry. There appeared also to be unusual evaporation of the water in the hills ; owing to the continual bright sunshine the water supply fell away suddenly, so that we were obliged to desist from elevating on the 23rd July, after running from the 23rd May. We had hoped that rain would set in in the autumn and enable us later to resume elevating, but the expected rain did not come in time for us to do so. From 15 to 25 men were employed working the mine while it was in operation, and the clean-up for the amount of ground worked was satisfactory."

The *Mount* claim, situated on the west side of Williams creek immediately below the Cariboo Gold Fields property, is a hydraulic proposition. In respect of the season's operations the secretary, Mr. Tregillus, says:—

"The season's water was much below the average, and without our reservoir we should have been helpless. Our bank has increased in depth 11 feet, and is now 51 feet high; the increase is composed of an additional 20 feet of hard clay, while the gravel decreased from a thickness of 16 feet in 1903 to 6 feet in 1904. We moved 17,000 cubic yards of material, at a cost of a fraction over 9 cents per yard, which was slightly in excess of the yield. We employed on an average five men when working."

The First of May Hydraulic Company, operating on upper Williams creek, had a satisfactory clean-up for the short time it was able to work; six men were employed.

The Forest Rose Hydraulic Company, which made extensive improvements in the fall of 1903 for the next season's work, by thoroughly repairing its flumes, ditches and plant, was much disappointed at the short run of water. Having a very high bank (about 100 feet), part of which is hard clay, but little headway was made during the one month it was able to pipe. The result was fairly good, however.

The *Mucho Oro* claim, on Stouts gulch, owned by this same company, was enabled this year (by the Wintrip Company having worked up to its lower line) to instal and work its hydraulic plant, and had a very successful run of 26 day's piping, giving the company a good dividend for the time worked. Six men were employed.

The *Wyoming* claim, also on Stouts gulch, employed five men, placed a new monitor on the claim and dug a new ditch. The wash-up was fairly satisfactory.

Lightning Creek and Tributaries.

This well-known stream, whose placers have yielded so largely in the past, is again giving evidence of coming to the front as a producer of the precious metal; chiefly from developments made by the Cariboo Consolidated, Limited, at their La Fontaine mine. As to present conditions, Mr. Bailey, M.E., the manager, says:—

"My report to you last year gave a detailed description of the plant that had been then installed. To this plant, during the past year, has been added a small saw-mill for cutting lagging, wedges, keys, etc. An hydraulic ram, operated by the water from the ditch from Lightning creek, has also been put in the pump discharge drain from the shaft, to raise water to the reservoir on the side-hill back of the shaft-house. This was made necessary by reason of the dryness of the past season. A sluice flume, for washing the gravels at the shaft-house, has been extended and housed in for a length of 90 feet.

"The main tunnel from the shaft was run a distance of 306 feet to the gravel in the deep channel. From this main tunnel 'drives' have been run both up and down stream, with the object of draining and blocking out the gravels in the deep channel. Cross-cuts have been run from these drives, and we now have practically 400 feet in length of the deep channel blocked out and in a condition to mine when once the gravel is drained. The total length of the various tunnels, drives and cross-cuts amounts to over 1,000 feet.

"That we are making good progress in draining the deep channel gravels is shown by the fact that we are steadily lowering the water level in the old *Eleven of England* shaft, situated about 550 feet further up the stream than our *La Fontaine* shaft. This lowering already amounts to 80 feet, since the water was first tapped by the main tunnel last April. We estimate that we still have a depth of about 40 feet yet to drain before we will be in a position to work out the gravels on the large scale contemplated.

"At present we are pumping approximately 1,300,000 gallons of water in 24 hours, or less than one-half the capacity of the pumps installed.

"The values obtained from the bedrock gravels are of the most encouraging nature, and prove without doubt that the gravels can be mined at a large profit when once the deep channel has been drained.

"A daily average of 40 men has been employed at the mine during the past year.

"The company did not operate the *Lowhee* hydraulic mine during the past season, as they decided it best to use their resources in developing the Lightning creek property.

"The *Ah Quay* hydraulic mine, near Stanley, also owned by this company, was rented to other parties and by them operated with fairly good results."

The Lightning Creek Gold Gravels & Drainage Company, after having been driven from its underground works last season, has done but little further to prove the value of the ground, confining its efforts to the procuring of additional plant and placing the same upon the ground, preparatory to installing and operating it in the early spring, referring to which, and other works in that vicinity, Mr. Boyd, of Cottonwood, writes me :—

"The Lightning Creek Gold Gravels & Drainage Company has delivered at the present location of its works at the wing-dam, a first-class Keystone drilling machine, with all the necessary plant for drilling, which the company intends doing in the early spring, to find the deepest channel of Lightning creek at or near the present works, and when determined, other works necessary for the opening of mining operations will be prosecuted without delay. At or near the wing-dam on Lightning creek, and for three or four miles further down, considerable mining has been done during the summer, and is now being done on the bars and benches, in a primitive way, by Chinese with rockers. Considerable gold is being extracted."

MOSQUITO CREEK.

On Mosquito creek, one of the tributaries of Lightning, the McPhail company is having a ditch made to convey water to where it intends commencing hydraulic works in the spring for the purpose of thoroughly testing the ground before making preparations to work on a more extensive scale. Further down Lightning creek and on Cottonwood river, below the bridge, considerable mining is being done and quite a quantity of gold has been extracted.

The Point Company has again this season proved a valuable contributor to the gold harvest of the district, but was prevented from working a great part of the season by the influx of water into its diggings, and the works are at the present writing closed down.

Some considerable work has been carried on during the year on different parts of the creek and its tributaries by individual miners, with, in most cases, indifferent results.

SLOUGH CREEK.

The exploiting of the deep ground of the Slough Creek, Ltd., has proven to be perhaps the most difficult and expensive proposition of its kind undertaken in this part of the Province. This enterprise having been referred to in previous reports at considerable length, it will be unnecessary here to make more than reference to the season's operations, For this information I am indebted to the manager, Mr. John Hopp, who, reporting to me on 29th November, says :—

"Since last year's report, after a short cessation of work about the first of the year, the Board decided to resume work in the two upraises, for the purpose of increasing the drainage area and thereby increasing, if possible, the flow of water, up to the capacity of the pumps. The flow is carefully measured daily over a weir dam placed in the air locks. All the water of the mine is forced to flow over the weir, and an accurate measurement is secured of the amount flowing per minute. The water made continued much the same, and for a short time increased slightly, though a number of new cross-cuts had been driven into the gravel. About the first of March a slight decrease was noticed, which has been steadily maintained ever since. On the first day of March we were pumping 774 gallons per minute, or 1,114,560 gallons in 24 hours. This has reduced steadily, and to-day's flow was 501.74 gallons per minute, or 722,505 gallons in 24 hours. The work of driving cross-cut tunnels was continued until August, when it was decided to discontinue this work, for although there has been a very remarkable improvement in the reduction of the heavy pressures and flow of water, yet these were too heavy to make satisfactory headway.

"The steady decrease of water during the entire spring freshet, and the continuous working in the tunnel at the same time, proves conclusively that there is no connection between the surface water and the water now being drained out of the gravel channel, which is covered with a capping of 100 feet of blue clay, and that it will be only a question of time when the ground will be thoroughly drained and easy to work. From the small amount of gravel taken from all of the openings into the channel most encouraging prospects of coarse gold were secured, although all of the gravel was shovelled out of a torrent of water, and it would be possible to save only a small percentage under such conditions.

"It was impossible to drift in an open face of gravel or to definitely locate the deepest part of the channel, and it was decided best to put in a diamond drill to take a cross-section of the channel from the main tunnel. This work has been carried on with a No. 10 American Diamond Rock Drill plant, using compressed air; and barring accidents, it is expected that this work will be completed about first of January.

"The pumps and machinery are in good order throughout, and with the continual drainage and decrease of water there is every indication of success in the near future."

The other mines on this creek and its tributaries, operated principally by Chinese, have produced, approximately, the usual amount of gold.

Willow River and Tributaries.

Willow River Mining Company.

This important and costly undertaking deserves more particular mention than I am in a position to give; not only because of the benefits its success would exert upon the community, but because of the moral effect in inducing other companies to undertake the exploitation of deep ground similarly situated, of which there is an abundance in the district. This company has certainly experienced many difficulties in reaching bedrock, principally from the influx of water, but has at last succeeded. While sinking the sump the workmen were driven out, but succeeded in pumping the water from the shaft with the powerful 28-foot water-wheel operating two 18-inch Cornish pumps, and the company was able to drive out through bedrock. When just getting into the channel, from which excellent prospects had been obtained, the workmen were again drowned out; but after fluming a part of the ditch and tailrace, the pumps were once more started. At this writing the diggings are dry and operations in the face will at once proceed, with every prospect of excellent results.

In response to my inquiry regarding the *Alabama* claim, Mosquito creek, the foreman, T. H. Flynn, briefly says :—

"The *Alabama* claim has done better this season than in any previous year, and the outlook is bright for the future. We have taken out about $4,500 this year, the result of 25 days' piping. We employed nine men altogether—two whites and seven Chinese."

The *Williams* is a hill claim adjoining the *Alabama*, Mosquito creek, and belonging to the same parties. Regarding the season's operations, the foreman, H. E. Flynn, says:—

"In regard to the operations on the *Williams* claim this season, we piped about 38 days with a very light head of water, seven men being employed. For 15 days of the above time we had only sufficient water to work the 1½-inch nozzle, which is a very light head considering that we are operating with a No. 1 monitor, with about 160 feet of pressure. Still, the yield of gold has been most satisfactory, considering the amount of ground worked, the value of the gold taken out this season being between $6,000 and $7,000, or an average of about $170 a day for the time worked. The expenses were about $2,000. We have just completed a reservoir on this claim which will hold sufficient water, with a half-head coming in, to operate for five hours with a full head. This will greatly benefit the claim during light water. The prospects for another season are very favorable."

On Albrecht creek, a tributary of Willow river, two miles below Dragon creek, Messrs. Clarke, McIntyre & Co. are running a prospecting tunnel to tap a channel previously discovered in the hill, upon which work is going on at the present time.

ANTLER CREEK AND TRIBUTARIES.

On the main stream there is but little to report. Henry Boursin, having re-located a portion of the ground formerly held by the Cariboo Deeps, Limited, continued a tunnel into the deep ground under the hill, in which fairly good prospects had been obtained by the former company, in the hope of finding a bedrock more favourable for the lodgment of gold, as, so far as the channel had been prospected, it was found narrow and exceedingly smooth. Work will be continued during the winter.

GROUSE CREEK.

The *Waverly* mine, of which J. Pomeroy is foreman, commenced work about the middle of May, and worked in all four months, employing seven men and taking out about 450 ounces. During this time the pipe-line was changed, but no new plant installed. The outlook is exceedingly good for many years to come.

The *United* is a company recently organised with a view to locating what is known as the lost "Heron lead." A tunnel has been driven into the hill some 400 feet, but as yet no indications of the lost lead have been discovered. Work is still progressing.

Of the other mines working on this creek, none have taken out more than working expenses.

CHINA CREEK.

The China Creek Hydraulic Co., under the management of B. A. Lasell, reports a very successful season on its properties on China creek, and of the showing in the mine Mr Lasell says:—

"Hydraulicing was commenced about the 15th of May and exceptionally good progress was made throughout the season's run, which ended about the 4th of July. During this time 6 days were lost by slides coming into the ditches, etc., making the actual run about 43 days. 101,000 cubic yards of material was moved. I will make no specific statement regarding the amount of gold taken out, but will say it was considerably above expectations. As the summer was an exceptionally dry one, only a short fall run was made. During the season the plant was put in excellent condition, the flume was taken out of the old cut and placed in a straight line through the pit, the ditches were cleaned and repaired and a new ditch was dug to carry water for a small pipe-line to be used in cleaning up. Surveys were completed for a dam which, when built next summer, will create a reservoir which will be used in storing water during the early part of the season, and will insure a good water supply for the greater part of the season. This mine has undoubtedly a very bright future. During the season 15 men were employed."

The mine on McBean bench, belonging to this Company, was worked but a short time in the spring, a pipe-line was laid and about 10 days piping followed, showing satisfactory indications of its becoming a mine when further developed. The water was required to work the China creek claim; hence the short run.

The Chinese companies working on Stevens, Beggs and California creeks have produced the usual amount of gold.

CUNNINGHAM CREEK.

The Bear Hydraulic Co., J. Wendle, foreman, possesses a hydraulic mine of much promise, and being one of considerable magnitude, its success will prove of much importrnce to the district. Respecting the mine, Mr. Wendle furnishes me with the following information:—

"This mine is situated on what is supposed to be an ancient channel. It is located on the southerly side of Cunningham creek about one-half mile below its confluence with Pass creek, and, as is frequently the case, it is very difficult to locate the general position of the ancient channel until a certain amount of work has been done.

"The equipment of this mine was finished late last season, and it was possible to do only a small amount of work in the mine before winter set in. This season's work was, therefore, principally of a prospecting nature.

"The sluice-flume was placed at a point carrying about 10 feet of bedrock, and work was continued, as was supposed, directly across the channel. After going ahead a distance of 250 feet a shaft was sunk, and it was found that the sluice-flume would be 20 feet above the bedrock at that point. The sluice was then moved and placed 20 feet lower. As this necessitated a rock cut and other charges, it was close to the end of the season before the work was resumed.

"The deposit in this channel is about 110 feet deep, and possibly 400 to 500 wide, only one rim being exposed, and, with the exception of a small amount of surface silt and mud, is gravel carrying values, although the principal pay streak is from 5 to 20 feet thick and lies on bedrock. The gravel is of a reddish brown colour and is easily washed. The gold obtained varies in size from fine flour gold to pieces worth five dollars, and is easily amalgamated. The mine is equipped with a 48-inch sluice, 4 miles of 5-foot ditch, 2½ miles of 2-foot ditch, 2,000 feet of 30-inch to 15-inch pipe, 1 No. 6 giant, with all necessary camp buildings. During the season 15 men were employed."

Higher up Cunningham creek is the claim of McGregor, Thompson & Ross, as are also those of R. Creswell and others; and although it is known these companies have taken out a considerable quantity of gold, I am unable to obtain particulars as to definite results.

EIGHT-MILE LAKE AND VICINITY.

The Thistle Gold Co., Ltd., of Eight-mile lake, has had another successful season, but, like the other hydraulic mines, was much handicapped from the scarcity of water for washing purposes, speaking of which the assistant manager, Mr. Burgess, writes me:—

"The season has been much shorter than usual, owing to the extremely light rainfall, 175 ten-hour shifts being the actual hydraulicing time, as compared with 275 shifts for the season of 1903. Piping was carried on through two No. 2 giants, under a pressure head of 100 feet. The total length of the system of sluices is now about 2,000 feet, which are set on a grade of 4 inches to the 12-foot box. With the exception of the head boxes, in which longitudinal riffles are used, this system of sluices is paved throughout with blocks. An open-cut drain, about 800 feet in length, was excavated during the season at the lower end of Eightmile lake. This lowered the surface of the lake about four feet, thereby giving greatly increased dumping facilities. An average of about 20 men are employed on this property.

"For the time being, hydraulicing has been discontinued on the Coffee creek property. A tunnel, now about 80 feet in length, is being run up stream in order to test the ground ahead. The indications for a paying property on this stream are very good."

The Slocan-Cariboo Company, of Canadian creek, has confined its efforts during the past season to determining the depth and course of the channel, by running a tunnel some 300 feet in length below the old *Clear Grit* workings, which has been accomplished in a satisfactory manner. Work is closed for the season, to be resumed in the spring.

On Jack of Clubs creek, the Discovery Company has driven a tunnel 1,200 feet to tap the hill channel, and sunk a shaft to the tunnel to facilitate the disposal of the dirt. Employed six men. The channel had not been reached when work was recently suspended for the season.

The Pleasant Valley, Limited, of Pleasant Valley creek, having installed water wheel and pumping machinery, is now in readiness to commence development work upon the return of the manager, who recently left for England upon a brief visit.

On Stoney creek, A. Stott & Co. have opened up a hydraulic claim which promises well, as, even in opening, it has paid current expenses.

On Summit creek, a number of small companies continue working, taking out small pay.

FRASER AND QUESNEL RIVERS.

On Quesnel river, the National Hydraulic Mining Company employed some 15 men during the season, but as to the result of its operations, I have been unable to obtain any information. It is, therefore, safe to conclude that nothing of importance has been developed.

On this same stream, James Deacon, having fitted up the old *McLaren* claim to be worked as a hydraulic mine, has the ground now fairly well opened up, and doubtless satisfactory results will be obtained another season.

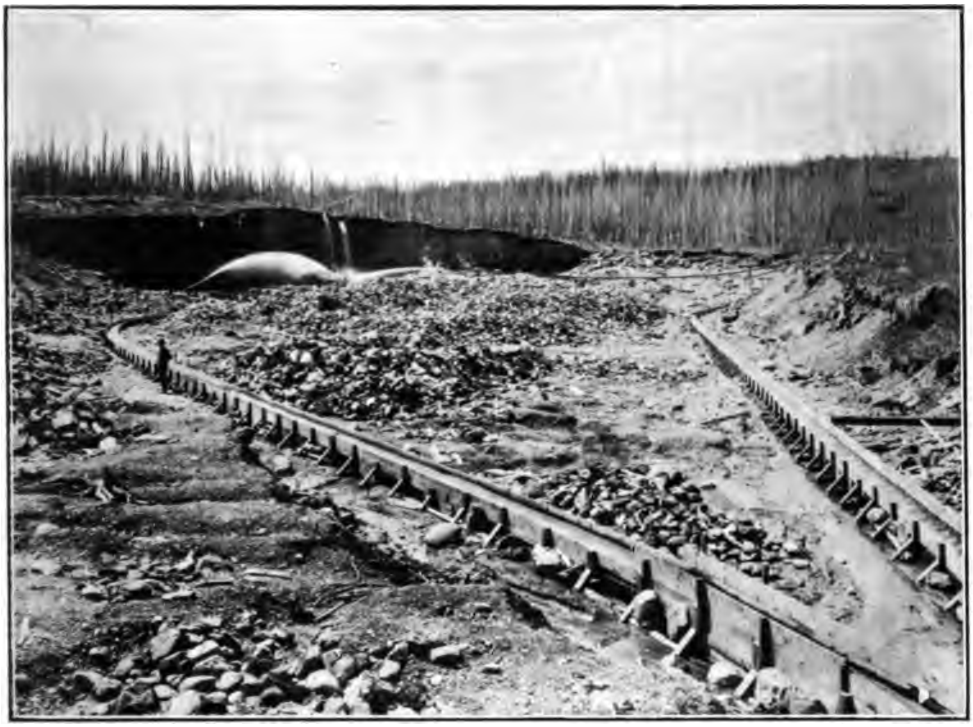
A few white men, and quite a large number of Chinese, continue to work the bars and benches of the Fraser and Quesnel rivers, with varying success, but usually reap a rich harvest when the water is low in the river, as it has been the present summer and fall; consequently, the gold product from this source has been somewhat better than usual.

RIVER DREDGING.

Nothing further has been done this season to prove that this system for the recovery of the auriferous sands and gravels in the beds of the streams may be pursued with profit; but, given improved transportation facilities, I personally have the utmost confidence that this system will ultimately prove a source of wealth to the district, as past experience has shown that the first cost of transporting and installing the plant is not the only drawback at present experienced, but the loss of time entailed from the breaking and wearing of the plant occasions much delay, and consequent expense, before the same can be replaced. Consequently, this present dormant resource will probably remain in *statu quo*, until railway communication is an accomplished fact.

QUARTZ.

If I except some half a dozen claims upon which sufficient was done to entitle their owners to a certificate of work, nothing has been done further to develop our quartz veins, save what has been accomplished by Messrs. Baker and Atkin.



THISTLE GOLD MINING CO.'S HYDRAULIC MINE—8-MILE LAKE, CARIBOO.

PLEASANT VALLEY, NEAR BARKERVILLE, CARIBOO.

Mr. Austin J. R. Atkin, who has been associated with Mr. C. J. Seymour Baker, as assayer and metallurgist, in exploiting the quartz veins of the district for the past two seasons, writes me regarding their operations, referring particularly to the discovery of a ledge of scheelite at Hardscrabble creek, which from present indications bids fair to be of much importance. Mr. Atkin says :—

"The season was spent in still further checking the information gathered in the previous two summers, and the least promising properties were temporarily thrown up. Although there are many ledges which will well repay thorough and systematic prospecting, as soon as a railway lowers mining cost, it is unfortunate that none but the very richest veins in the country can be opened up under present conditions. The most important find of the season, and one which may prove of great commercial value, was made on Hardscrabble creek.

"The following account may draw attention to the care which should be exercised in having every unidentified mineral thoroughly examined and its composition determined: In drifting up the channel some years ago for alluvial gold, some pieces of white mineral were occasionally found, and an examination showed them to be barytes (Ba. S0 4). Later on, the white pieces became more numerous, and seemed heavier, until the dumpbox required so much water to keep the riffles clear, that but little of the fine gold was saved. It was noticed that the finest mineral was the heaviest, and was unlike the white substance (barytes) which first caused the trouble. When the situation was at its worst, a change took place in the character of the bedrock, and at the same time the troublesome mineral disappeared, so that no further investigation into its composition took place.

"Some 'black sand' had been put away and the writer was asked how best to clean it, and to explain the circumstance of the white mineral. After separating some of the latter, an examination, since checked many times, showed it to be *scheelite*, of very good quality. The old workings being still in good condition, an attempt was made to find the deposit from which it came, and very little work exposed the scheelite-bearing zone. This consists of highly altered country rock, the scheelite being scattered through it in small patches, but it is in the quartz stringers that most of the mineral is found. Some of these, varying from one inch to four inches wide, contain about one-third scheelite, with a little galena, and products of decomposition of iron pyrites. This zone appears to be from 12 to 20 feet wide, as determined by work done up to July, 1904, and gives every promise of turning out a valuable deposit. Unfortunately, the country rock has been altered by the infiltration of calcite, until it approaches limestone in hardness, so that, before the lode can be opened up, machinery will have to be installed to concentrate the calcium tungstate.

"A test was made by washing some of the decomposed surface, but the ore had not sufficiently weathered to make this very satisfactory, as when the rock was exposed in Tertiary times, the stream removed the surface as soon as it was at all decomposed. However, sufficient clear scheelite was obtained by this crude method to indicate a concentrating ratio of 1 into 10 (approx:). These concentrates contained about 70 % tungsten trioxide, with very little galena or pyrites. With a ready market, which this mineral commands at present, the outlook for the new find is very encouraging.

"There are other deposits of scheelite in the Cariboo schist belt, for the writer has specimens in his possession which are 'float' from other ledges, which further prospecting may discover, although these ledges are not to be looked for in Willow river section."

A quantity of this scheelite was sent to Mr. E. C. Rollins, of Chicago, to have tests made to determine its value, in response to which a communication was received from Messrs. Cramer and Burt, of 1,114, Monadnock Building, Chicago, stating, "The scheelite was of good quality, and there was at present a considerable demand for it, at prices varying from $360 to $460 per ton, according to quality." As there is no duty on tungsten ore going into the United States, the discovery of its existence here in large quantities but emphasizes our demand for proper transportation facilities.

OFFICE STATISTICS—CARIBOO DISTRICT.

Free miners' certificates issued, company	11
" " individual	347
" " special	1
Records and transfers of recorded placer claims	183
Leaves of absence	49
Water records issued	31
Placer mining leases issued	43
" " cancelled	128

Revenue Receipts.

Free miners' certificates	$ 2,753 00
Mining receipts general	18,359 35
Water grants and rentals	1,478 25
Leaves of absence	172 50
Land sales	4,841 85
Other land revenue	593 50
Mineral tax	2,171 73
Revenue tax	3,171 00
Real property tax	3,042 00
Personal property tax	3,125 68
Wild land tax	156 70
Income tax	237 21
Licence, spirits	1,475 00
Licence, trade	545 00
J. P. Court fines	342 50
Miscellaneous receipts	228 70
Total	$42,683 97

QUESNEL MINING DIVISION.

REPORT BY W. STEPHENSON, MINING RECORDER.

In submitting this the annual report, with the estimated yield of gold obtained for the mining season of 1904 from Quesnel Mining Division of Cariboo District, I find there is a slight increase over last year's yield of gold, but not nearly as much as was anticipated at the opening of the mining season, owing to the fact that the past season was one of the driest on record in this section, where, it may be said, we had no rain during the summer. Consequently, after the water from the snowfall was exhausted, the streams quickly dried up and the season was short for hydraulic mining.

On Keithley creek, Messrs. Veith and Borland have a good drifting claim, from which they have already taken out a considerable amount of gold, and the prospects for the future are good. Underground mining is very limited in this Division, and as for hydraulic and other surface mining, a good supply of water is needed, and if not obtained, the output of gold falls short. On Snowshoe creek the water gave out early in the season, and the hydraulic claims had to suspend work after a short run.

On Goose creek, Mr. Thos. Helgesen has been steadily working on his lease all the season. The report is that he is cleaning up with satisfactory results. On the north fork of Quesnel river there are a few white men working, taking out fair wages, besides which there are a number of Chinese scattered along the river, working in a desultory manner, working a few days or weeks in a place then moving to find another place. Such is their mode of working, during low water, until the cold weather shuts them off. Down the main Quesnel river the work is about the same as on the north fork, as no organised companies are working on either stream.

*On the south fork of Quesnel river the Consolidated Cariboo Hydraulic Mining Co., J. B. Hobson, Manager, had only a short season's run, the water giving out much sooner than expected, there being no rain to keep up the supply in the reservoirs. The work of driving the tunnel through the rimrock, from the present river to the old channel in which they are working, proceeded satisfactorily, until cold weather caused the work to be suspended. This tunnel, when completed, including the upraise, will be 1,200 feet long, and is 10 x 10 feet in the clear and on the grade of the flume that will be laid through the tunnel.

On the Horsefly river, at Harper's Camp, Mr. R. T. Ward resumed operations last spring, and was doing well until forced to suspend on account of some company trouble. The work was shut down for the balance of the season. On the upper Horsefly, about 50 miles up the river from Harper's Camp, some new diggings were found during the past summer. Mr. W. H. G. Thompson, one of our oldest miners, was going up there, and as I could not spare the time to go, I asked him to examine and give me a description of the place, which he did. His opinion is that the place will pay men very well to work the ground in small companies, of from four to six men in a company. The pay-streak of gravel is from eighteen inches to two feet in thickness and lies upon a stratum of hard clay, at a depth of from eight to ten feet below the surface. It is likely some parties will remain on the ground through the winter to prospect.

There is nothing to report as to lode mining in this Division, as no work in that line has been done for the last year.

**See* also page 37.

OMINECA DISTRICT.

OMINECA MINING DIVISION.

REPORT BY FRED. W. VALLEAU, GOLD COMMISSIONER.

I have the honour to submit herewith my seventh annual report upon the mining industry of the Omineca Mining Division for the year 1904.

As predicted in my last report, the prospect of having a transcontinental railroad built through the district has been the means of attracting prospectors and capital, with the result that portions of the district hitherto unknown to the prospector have been visited, and paying creeks are reported to have been found, many of which will, no doubt, well repay development work when freight rates are lowered, as they will be when the district has railway communication with the Coast.

While active development work in hydraulic mining has, this past season, been confined to Tom, Vital and Lost creeks, considerable prospecting has been carried on at different points in the district, notably along the Oslinca, Meslinca and Findlay rivers, with their tributaries, to the north, and the Peace and Parsnip to the east, where several very promising localities for placer, quartz and coal have been reported. More attention is now being paid to quartz mining than ever was before, and a number of men have been looking over the district this season.

Vast areas of timber (spruce and cottonwood) suitable for lumber, and especially for the manufacture of pulp, have also been reported along the Omineca, Oslinca, Meslinca, Findlay, Parsnip and Peace rivers.

This past season has been one of the driest and warmest experienced in the district for years, rain falling but four or five times during the entire summer, and in consequence the creeks became extremely low after the month of July. The smoke from forest fires could be seen almost continuously to the north and east, although there were no fires in the immediate vicinity of Manson.

Following will be found in detail what has been done this year.

MANSON CREEK.

43rd Company.

The 43rd Mining and Milling Company, of Cariboo, Limited Liability, having allowed its leases to lapse on account of non-compliance with the terms, forfeited its property and water rights, but has this season re-located and been granted five creek leases as well as a water grant of 4,000 miner's inches upon Slate creek, and will begin active operations next year.

The manager of the company spent the season in the district looking after the company's stores, repairing flumes, etc.

Omineca and Peace River Mining Company, Limited Liability, of Victoria, also allowed its leases to lapse, but has re-located three hydraulic leases on Manson creek, and has had a representative in the district this season looking after its property.

The *Evans Black Jack* claim, having been leased by Mr. Evans to the Omineca and Peace River Mining Company, was forfeited at the same time as the leases held by that company, but has been re-located by Mr. Evans, who has taken out also a water right of 5,000 inches. This claim is now well opened and has been sufficiently proved to warrant its being worked upon a large scale. Negotiations for the purchase of this property are now pending.

CHINESE PLACER CLAIMS.

Twelve placer claims are being worked by Chinamen on Manson creek, but nearly all of these are in old ground and little more than wages have been taken out.

LOST CREEK.

The *McKinnon* mine, consisting of a hydraulic and a creek lease, was acquired last spring by Messrs. Newbery and Child, who, with a gang of men, have been employed all season in opening up and developing their property. A hydraulic plant has been installed, water brought on, and a pit opened which shows a good streak of pay gravel. Water was scarce this season, as it was late when they commenced actual mining.

Work was carried on upon the *Newitt* and *Mullen* mine last winter, the tunnel being extended some 500 feet, in order to tap the deep channel of Lost creek, but owing to an accident by which Mr. Newitt lost a portion of his hand by an explosion, nothing has been done this past summer.

The *Bread Winners'* mine, a group of six hydraulic leases situate on Manson, near the mouth of Lost creek, owned by Mr. E. G. Tilton, has been again laid over this season.

GERMANSEN CREEK.

A creek lease at the old *Toboggan* claims was granted this season to J. J. May, on which a wing dam will be built this fall to turn the creek and work will be carried on next season.

Eleven placer claims have been taken up by Chinese on Germansen creek this season, but, as the ground where they are is deep, they have not made much more than wages.

TOM CREEK.

The owners of the *May Flower* mine have carried on work continuously all season. The ground is deep, about 18 feet after ground-sluicing, and very hard to work. Nine men have been employed.

VITAL CREEK.

The property formerly held by the Vital Creek Mining Syndicate, and now owned by Dr. Powell, of Victoria, has this season been leased by the Messrs. Condit Brothers, and is being opened up by them. Eight men were employed. Most of the work done this season has been ground-sluicing by means of a "bucking hydraulic dam," which has worked very satisfactorily. The creek bed, having a heavy grade, was ground-sluiced down some 26 or more feet.

The Caledonia Gold and Silver Mining Co. has had two men sinking a shaft to bedrock, prospecting the property. A report from the manager, at Nanaimo, has been asked for but has not been received.

FINDLAY RIVER.

Three hydraulic leases have been granted in the vicinity of Pete Toys bar, and four quartz claims have been located about 12 miles south of Fort Grahame. Prospectors are wintering on the headwaters of the Findlay river, where they report having discovered good placer ground.

OFFICIAL STATISTICS.—OMINECA MINING DIVISION.

Placer leases in force	31
" " issued	12
" claims re-recorded	12
" " recorded	11
Mineral claims "	5
Payments, in lieu of assessment	2
Conveyances, etc	13
Water records	14
Lay-overs	3
Powers of attorney recorded	10
Free miners' certificates issued	92

Revenue.

	1903.	1904.
Free miners' certificates	$ 314 50	$ 430 00
Mining receipts, general	1,894 51	3,578 70
Miscellaneous	439 90	481 96
	$2,648 91	$4,490 66

CASSIAR DISTRICT.

ATLIN MINING DIVISION.

Report by W. F. Robertson, Provincial Mineralogist.

The Atlin District formerly included the Atlin, Bennett and Chilkat Mining Divisions, but, by an Order in Council approved October 16th, 1903, which came into force January 1st, 1904, the Bennett and Chilkat Mining Divisions were done away with, and the territory formerly embraced in these Divisions has been included in the Atlin Mining Division, of which extended Division the Recording Office, with that of the Gold Commissioner, is at Atlin. The Atlin Mining Division, as at present constituted, may therefore be described as all that portion of British Columbia lying to the north and west of the divide between the watersheds of the Taku river, on the south and east, and that of Atlin lake on the north and west.

CHILKAT MINING DIVISION.

Of the former Chilkat Mining Division, the southern boundary has been considerably altered by the recent decision of the Alaska Boundary Commission, and most of the creeks upon which the placer gold was discovered in 1900 have now passed into Alaska. Rainy Hollow, however, wherein a large number of mineral claims had been located, described in the Report of 1900, still remains in British Columbia.

This district was not visited by the Provincial Mineralogist this season, but it is reported to him that work still progresses slowly on these properties and that the development has in many cases been satisfactory to the owners.

BENNETT MINING DIVISION.

In the former Bennett Division no placer ground has been found. A number of mineral locations, however, were recorded near the shores of Bennett lake, but as yet none have shipped any ore, other than as sample lots.

Mr. Whitfield, one of the owners of the property, has supplied the following information with reference to the *Gridiron Group*, one of the properties being actively prospected in this section:—

Gridiron Group.

The *Gridiron Group* consists of four unsurveyed mineral claims, situated on the west side of Bennett lake, about six miles from the town of Bennett, and is owned by Whitefield and Hildebrand. A tunnel has been driven in, 30 feet above the lake, for 110 feet, on a talcose crushed zone or slip, about 16 feet wide, having a strike E. and W., with a dip to the north of 45 degrees. This zone consists of alternating bands of quartz and talcose matter; the quartz contains iron sulphides carrying values in gold and silver, while some lead and antimony is present in places. The talc also contains some crushed ore which can be saved by concentration. The country rock is said to be porphyry. A short distance from the mouth of this tunnel there is a clearly defined vein, about 8 inches wide, carrying iron pyrites, from which high assays have been obtained. The trend of this vein should make it cross the line of the tunnel about 180 feet beyond its present face, to which point of intersection it is intended to push the tunnel with all dispatch. On the property there has been erected a wharf 18 feet by 24 feet; also a shack and blacksmith shop, while an arrastra, 9 feet in diameter, driven by a windmill, has been constructed, to test the ore.

On Canyon creek, about 2½ miles north of the *Gridiron Group*, R. Peden *et al* have been doing work on some 8 claims, and have driven in 4 tunnels about 25 feet to 30 feet each.

Dr. Runnels has been doing development work on a group of claims in this vicinity, of which no definite information was obtained, but it is understood the work has been chiefly confined to surface prospecting, from which some encouraging assays have been obtained.

ATLIN MINING DIVISION.

The Atlin Mining Division continues to be the chief factor in the placer gold production of the Province, and from present indications, promises to be an important producer for some years to come. This district was last visited and reported upon by the Provincial Mineralogist in 1900, during which interval the class of deposits being worked and the methods of working have changed materially, but the actual output of gold from the camp has been maintained at about the same amount, namely, from $300,000 to $450,000 per annum, while this year the output promises to be about $530,000—a greater production than has been since 1899.

The district was discovered in August of 1898; or, rather at that time the news of the discovery reached the "outside," although the discoverers had been prospecting the district for the greater part of the summer. These discoverers, Fritz Miller and his associates, belonged to that hardy class to which British Columbia owes so much, the pioneer prospector—the men who penetrate and search out the unexplored parts of the country, discovering the hidden stores of mineral which Nature has distributed, with no niggardly hand, throughout the Province, though often hiding them away in remote places, leaving but a very "blind trail" behind her. This trail these prospectors tried to follow, and successfully, unearthing that "pot of gold" which has proved nearly as elusive as that supposed to hang from the end of the rainbow, and from which has been taken out up to date about $2,995,000, the product of the Atlin district in placer gold.

In view of the benefit conferred upon the country by the prospector who discovers a new mining district, the reward which he receives seems entirely out of proportion to the service rendered; in fact, the discoverer of a new placer mining section receives merely the reward given for the discovery of gold on a new creek in an already well-known placer district—*i. e.*, the privilege of claiming, as discoverer, 600 feet (or a party of two discoverers gets 1,000 feet) instead of 250 feet allowed to subsequent locators, and this not in fee simple, but with merely the right to work this larger claim under the same conditions as others who were not pioneers, but merely followers of more enterprising or fortunate leaders.

It may not be out of place in this report to mention that the discoverers of the Atlin camp were fortunate enough to stake ground which has proved to be about the richest in the camp, and, while none of them made a fortune, at least the leader, Fritz Miller, secured a competency, which, unfortunately, he was not long spared to enjoy, as he died in Atlin in August, 1904, and was buried there. The public funeral, at which the Government was officially represented, was but a slight recognition of his services to this district in particular and to the Province in general, as by his efforts, or good fortune, Atlin was brought into existence.

The earlier discoveries of placer gold were made on Pine creek, and so far the productive mining has been limited to this creek, with its tributaries, including Spruce creek ; and to McKee creek, which latter has its source adjacent to that of Spruce creek, but flows westerly into Atlin lake, entering such about ten miles south of Pine creek. As the available ground on those creeks was taken up, prospecting was pushed further afield, and gold has been found on several other creeks, but, apparently, not under conditions or in quantities sufficient to attract mining by individual placer mining methods, although, in several instances the prospecting has given results which indicate probable opportunities for the installation of plants for operation by hydraulics, or some other cheap mechanical method of handling large quantities of low-grade material.

Of these outlying districts which have more recently been occupying public attention, there is, lying to the north of Pine creek,

FOURTH OF JULY CREEK.

Fourth of July creek flows westerly, approximately parallel to Pine creek, a range of hills separating their watersheds, and towards its headwaters a number of mining leases have been taken up, but as yet no plants have been installed.

CONSOLATION CREEK. *

Pine creek, with its tributaries—including the creeks flowing into Surprise lake—and Fourth of July creek, "head up" in the range of mountains forming the divide between the drainage area of Atlin lake and that of Gladys lake.

Over this summit from Fourth of July creek, and flowing to the north-east, is Consolation creek, which empties into Gladys lake, and is therefore in the Teslin Mining Division, but the prospecting of the creek has been done by men coming over the summit from Atlin.

During the past summer a number of leases have been located on this creek, on which ground very encouraging prospects are reported to have been obtained, but as yet the prospects do not indicate ground suitable for individual mining, though it may prove good for hydraulic workings. It is too early to predict what the creek may amount to as a producer of gold, as no mining has as yet been done, but the discoveries go to indicate that the gold-bearing area may extend considerably further than was supposed.

O'DONNEL RIVER.

Prospectors proceeding up Spruce creek to its source found there a large plateau covered to a considerable depth with gravel wash. This plateau was also the source of certain tributaries of the O'Donnel river, a large stream flowing parallel with Pine, in a general south-westerly course, and entering Atlin lake about 20 miles south of the mouth of Pine creek.

During this past summer leases have been granted of ground on the main O'Donnel river, and on Feather, Slate and Fox creeks, small tributaries of the main river. Some of these leases have been surveyed, and steps are being taken towards operating the ground by mechanical means, but no operations have as yet been undertaken, except on a small scale.

On Bull creek, hydraulic operations were carried on this past summer with the aid of a canvas hose and a pipe, and it is reported that about 100 ounces of gold were recovered. Although the prospecting of Fox creek yielded some returns, the amount could not be ascertained.

GRAHAM CREEK.

Among the outlying creeks upon which gold has been found is Graham creek, which flows into the Taku arm from the north. A large number of placer locations were made here in

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* See also report on Teslin Mining Division.

1900, but since that time the creek has been abandoned and the claims have lapsed. Certain of the ground was subsequently taken up under leases, but, so far, no attempt at systematic work has been made.

Gold has been reported as found on the upper stretches of the Terra Heena river, but there is no official information of its occurring under workable conditions.

Within the bounds indicated by the creeks mentioned is the whole of the known commercially gold-bearing deposits of the district.

Before a deposit can be said to be gold-bearing commercially, the conditions surrounding such deposit must be taken into account. In hydraulic mining, for example, the conditions are :—

1st. The quantity of gold per cubic yard in the dirt required to be moved, and the form in which it occurs.

2nd. The quantity and availability of water, etc.

3rd. The character of the deposit and its amenability to the hydraulic stream, the grade of the bedrock, the quantity of boulders, etc.

4th. The possibility of a dump for tailings.

All of these conditions are necessary to success, though the importance of any one condition diminishes in proportion to the excellence of the other conditions. The point might be similarly illustrated regarding both individual placer mining and dredging. Locations are supposedly made only when there is at least a *present* prospect of their being *commercially* workable, not only as to the sufficient presence of gold, but as to the surrounding conditions. Since "conditions" change as the country opens up, as labour and supplies can be had cheaper, and as cost-saving devices are introduced and improved, we may look in the future to possible further extension of the goldfield than the locations at present recorded would seem to indicate.

The lapse of four years which had taken place since the writer's previous visit to the camp rendered to him noticeable the changes which had taken place in that time, possibly more so than they would be to residents, to whom such things have been a gradual transition. Probably the most encouraging fact noted of the camp is the maintenance during these years of the output, which still continues to be made from the same creeks and from within the same area as in 1900. Then, the gold was taken almost entirely from the beds of the modern creeks, and as their extent was limited, their exhaustion seemed to be within a measurable limit of time. Now, these creek beds have ceased to be an important factor in the production, except where worked by a company, or where individuals have consolidated their interests, and, working together, practically form a company. Such concerted effort seems to have rendered workable further and deeper reaches of the creek bottoms than was formerly anticipated, and this promises to continue, through the introduction of mechanical power for handling the dirt or overburden.

Then, the benches and the "old yellow deposit," though they were known to be gold-bearing and their importance was recognised, were still undetermined quantities. The benches have been worked back by hand for a certain distance from the creek, and as this distance, with the increasing overburden, became too great, hydraulic methods were introduced, which, having emerged from the experimental stage, now give definite promise of success.

The "old yellow deposit" had then been definitely determined in only a few places, and only near the "outcrops," so to speak, although the writer considered it safe at that time to say that "indications are that it extends for some distance into the "bench claims," and these indications have been proved correct by numerous drifts from the creek valleys and, in its deeper portions, by shafts with drifts therefrom.

Then, a placer claim was workable only when, during the short summer season, it would supply the miner with his necessities for the whole year. Now, these "drifting propositions" provide winter work for men, enabling them to work in summer placer claims yielding a smaller return than was formerly necessary.

And the end is not yet, as far as this "old channel" is concerned, for its limits have not as yet been defined. That it is much greater than was formerly even suspected is certain,—and it is almost as certain that for years to come it will continue to be mined and to produce gold.

From the nature of drift mining, it does not here promise large enterprises or great individual profits, the gold therein being very uniformly distributed, and in amount only such as to pay good wages for the labour expended. This means for the camp a long, steady existence, since the greater part of the "old channel" is under so great an overburden as to be workable only by drifting.

Where the deposit occurs along the valley of the present stream, as on lower Pine and Spruce creeks, and where it has been cut by these streams, it is being attacked from the valley by hydraulic methods.

Since the previous visit of the writer, the development of the camp has rendered clear many points which were previously little more than indications, and as such were given in the Report of 1900. The conclusions then arrived at have been almost exactly borne out by the subsequent work; the area of the field remains the same; the evidence is strengthened that Pine and Spruce creeks at one time joined about Stephendyke and then debouched to the north, towards Trond gulch, emptying into a lake which then covered all the flats at the Half-way house, and that the present course of these streams below this point is of more recent cutting. The "old yellow channel" has developed along the lines then indicated, but to an extent not then hoped for.

In 1900 the Provincial Mineralogist attempted to ascertain the direction of flow of this yellow dirt, by taking levels at various points, and while these levels were not conclusive, they indicated a flow, which subsequent work has confirmed, giving a grade to the deposit conforming in direction to the flow of Pine and Spruce creeks, but it is so slight (being between 1 and 2 per cent.) that it is difficult to believe that the heavy material in the deposit would be carried by a current produced by such a grade; and further, the workings of the hydraulic pits, etc., notably that of the North Columbia Co., on Pine creek, expose a face in which the heavy boulders and angular fragments are so deposited together as to render it extremely improbable that this deposit is an "*old channel*," in the usual meaning of that term: viz., the bed of an ancient stream.

In Cariboo, and elsewhere in British Columbia, where the placer deposits occur, the "old channels" contain in themselves the evidence of the direction of their flow; and this is shown by the more or less uniform size of their constituents, by the rounded or flat water-worn form and faces of the gravel, and, above all, by the "shingling" of the flatter stones in the deposit, while the gold is usually on bedrock or in some defined stratum.

All of such evidence of flow is lacking in the old "yellow deposit" of Atlin, and while some of the boulders are large and rounded, many are angular, the flat ones often standing on edge, as though so dropped into mud in still water. The greater part of the deposit consists of granite fragments, now almost decomposed, with resultant clay (kaolin) and grains of silica. While the gold here is found for the most part near bedrock, though not necessarily *on* it, it occurs some height above—more or less throughout the deposit. The characteristics of the deposit did not seem to admit of its having been caused directly from glaciers. The evidence is such as to force the conviction that this deposit was not formed in rapidly running water, but that it was dropped in comparatively still water on a bottom (bedrock) such as that of a lake or sea, with a *slope*, but not a *channel.* As to exactly how the dirt was deposited, there is room for various theories, but the most probable seems to be that glaciers, carrying in their bases the dirt, slid into a sea or lake and, driven by wind or current into this bay, there melted, the dirt dropping to the bottom, gradually forming the deposit in question.

This is further borne out by the fact, reported by the Superintendent, that in the *Deeks* pit, on Pine creek, during the hydraulic working, a layer of seashells was found in and near the top of the yellow dirt. This layer was very local, and did not extend to the adjoining pits, and was, unfortunately, all washed away before the Provincial Mineralogist visited the camp.

It is not very clear where these glaciers were formed, as certainly no quartz has been found in the vicinity which would justify the belief that it is the *madre de oro.*

PINE CREEK.

Of the producing creeks, Pine, with its tributaries, still continues to be the most important. Of the main creek it may be said that practically all of it has passed out of the hands of individuals and is now held by companies.

A cold snap having come in the last part of September, a few days before the camp was visited by the writer, most of the individual workers in the camp had been "frozen out," and had stopped work, although at least five weeks' fine weather followed, so that the details of work done by individual miners on this and other creeks are best given by the Gold Commissioner, in his report, as he was with the camp all season, therefore this report will deal only with the general features.

Pine Creek Power Co.

The Pine Creek Power Co. is the outcome of the old Sunrise Co., and of this Mr. F. T. Blunck is president and manager and a principal owner. The company has leases on the south bank of Pine creek, almost opposite the old *Sunrise* ground and below *Discovery* on the creek.

Under the superintendency of Mr. W. W. Loveridge two adjacent hydraulic pits, working into the south benches from the creek valley, have been opened up, and these, although separated, are practically one pit subdivided, the division between them being kept, so that, while clearing away boulders or blasting in one pit, the water may be used uninterruptedly on the other.

The overburden of deposit consists of a light glacial mud and gravel, which forms the capping of the benches and which is considered devoid of gold. Underlying this is a deposit of coarse, well washed gravel, containing a few large boulders, of which some are apparently from the old yellow deposit, cemented together by a blue clay, the whole having a bluish colour which gives the deposit a distinctive appearance. This deposit probably belongs to what was described in the Report of 1900 as "the second run of gold," which in many cases overlies the yellow dirt, and frequently shows wash derived from the cutting of the yellow channel. From the face of the pits, for practically as far as they have been opened, this blue dirt reaches to bedrock, and it is this material which so far has been worked. In a couple of places in the face, however, yellow dirt has begun to show on bedrock, rising up in the face as work proceeds, so indicating that the yellow deposit will probably be found to be the bedrock deposit of the future; a fact which is considered encouraging, since the yellow channel is the one which in Atlin has been found most consistently persistent in its gold tenure.

It is too early to predict whether, as work proceeds, the yellow channel will in time gradually replace the blue, or whether the blue will be found to continue overlying the yellow. The writer, however, is of the opinion that the former will prove to be the case.

While the overburden washes away very easily and the gold-bearing deposit washes readily, some little difficulty is found in disintegrating all the clay, which has a tendency to pass through the sluice, carrying the gold with it.

The bedrock consists of what has been classed by the geological survey as the "Magnesian rock" of the camp, but it is so very much cut up by igneous dykes as to be almost replaced by them. These dykes, which appear to have been porphyritic in structure, are mostly of a light yellowish colour, and are soft and much decomposed, and this decomposition greatly facilitates the cleaning up of bedrock in the pit, as the dykes are readily washed away by the hydraulic stream for a depth of a foot or two.

With these softer dykes are others, dark in colour, hard and basaltic in character, which withstand the hydraulic stream and stand up in knobs and ridges in the pit but do not offer trouble by holding the gold. The bedrock seems to have a gradual slope, rising from and up the creek, but is too flat to supply a sluice grade. The elevation of the bedrock above the level of Pine creek is estimated at about 20 feet, and this at present provides dump for the tailings, but how long it will continue to be available depends upon how much of the season's dump may be washed away by the following spring's freshet, and, as the face of the pit recedes from the creek, the question of stacking the tailings will eventually have to be met.

At present each pit is provided with a Loveridge derrick, worked by water power, and with a reach of boom sufficient to cover the workings; and with this the boulders are piled up in the pit. The derricks are guyed with wire cable and have an extension boom, the motive power being supplied from a small Pelton wheel carried under the platform of the derrick. This wheel at present only raises and lowers the boom and load, and a great improvement would be effected in having it rigged to swing the derrick, this work having, so far, been done by hand.

The main sluice in each pit is about 60 inches wide by 36 inches deep, has a grade 4.7 and 5 inches to the 12-foot box, and this, with the water supply available, is sufficient to carry away the dirt.

A crude attempt at providing an under-current in the sluice has been made, which consists of a series of rectangular bars of steel, about 3 inches by 1 inch, set on edge across the bottom of the sluice for a space of about 30 inches, with a nominal aperture between them of about ⅛ inch. The material discharged through these openings with the water is led on to a large apron provided with riffles about 1 inch deep, laid crosswise. In practice these orifices are found to be either so choked up that practically nothing gets through them, or, if opened, to allow such a rush of water that it is questionable whether the apron would catch or hold fine gold. As a matter of fact, nothing was being saved by them when the property was visited.

The water supply is taken out of Pine creek, about 2 miles below Surprise lake, and at a level of about 30 feet lower than the lake, and is conveyed through the old *Sunrise* ditch, down the north side of Pine creek, to a point about half a mile above the town of Discovery. Here it is carried across the valley in a steel inverted syphon to the southern bench, where it enters a second ditch, by which it is carried to a pressure box located on the hillside about 120 feet above the level of the pits, and thence to the pits by a slip joint steel pipe-line. A branch from the main pressure pipe leads to each pit, and is provided with suitable gates, so that the water may be used in either or both, as desired.

It is not desired that the exact output of the pits for the season be published, but the President, Mr. Blunck, states that it was sufficient to be quite satisfactory to the company and to justify the installation of a plant to bring on water in greater quantity and at a higher pressure. Mr. Blunck has kindly forwarded the following details as to the season's operations:

"The work of getting the ditches and pipe-line in shape for the summer's work was begun in April. Piping began on June 9th, and continued until October 24th, equivalent to 118 days of 24 hours each. During this run some 130,312 cubic yards of dirt were removed, the bank washed was from 35 to 40 feet high, and the area of bedrock stripped was about 9,925 square yards. In doing this work 28,750 miner's inches of water (almost 2,000 inches daily) were utilised. The highest number of men employed at any one time was 54, and the lowest 18, or a total of 28,898 hours' labor was employed. The wages paid were at the rate of $3.50 per day and board. The season's operations were fairly successful. After work was closed down this fall, the company was engaged in making important changes in its water supply system, substituting for a long stretch of wooden flume a ditch line of larger dimensions, by which it is hoped to obtain not only an increased water supply, up to 3,000 inches, but also to permit of work being started from three to four weeks earlier in the spring. The estimated cost of this improvement is $14,000."

The North Columbia Gold Mining Co.

The North Columbia Gold Mining Co., of which Mr. J. M. Ruffner is Manager, with office at Discovery, owns certain leases situated on the south bench of Pine creek, and, beginning in the month of August of 1904, opened up a hydraulic pit about opposite the old creek claim, *No. 8 above Discovery*—that is, about opposite the upper end of the town of Discovery. The property is on the same bench as is that of the Pine Creek Power Co., and about 500 yards higher up the creek. The occurrence of the gravels and of bedrock here is practically the same as in the Pine Creek Power Co.'s pits already described, the only notable difference being that here the "yellow dirt" covers bedrock in the whole pit, increasing in thickness from 2 or 3 feet near the mouth to 15 or 20 feet at the face, and being overlain by the blue dirt and glacial wash. Though the pit was opened up only late this past summer, it has been pushed forward until the face is into the bench about 300 feet. The pit was opened with a cut of about 100 feet wide, but as work progressed this was extended until, at the end of the season, the face was approximately 300 feet long, and had an average height of about 66 feet.

Water Supply.

The water supply is derived from Pine creek, being taken out at the flats, which extend some distance below Surprise lake, and at a level, practically, as high as could be obtained from the lake. The ditch follows the south bank of the creek and, from the intake to the pressure box, is about four and a half to five miles long.

In cross section, the ditch is 3 feet deep, 4 feet wide at the bottom, and 9 feet wide on the top, with a grade of 7.9 feet to the mile. The pipe-line from the pressure box is 24 inches diameter and 1,500 feet long, made of No. 14 and No. 16 sheet steel, in sections 16 feet long with slip joints. The pressure in the pit is equivalent to about 150-foot head, which is utilised through two No. 4 monitors with from 5-inch to 7-inch nozzles.

Sluice.

The main sluice is straight and almost 500 feet long, with a grade of 6 inches to a 12-foot box. The frames are made of 5 by 7-inch lumber and are 60 inches wide by 30 inches deep inside, lined on the bottom with 2-inch lumber and on the sides with 1-inch. The blocks are 6 by 6 inches and 10 inches deep, of sawed lumber. The riffles are 2 by 2 inches. One of the few weak points in the plant is undercurrent in the sluice, which is similar to that used by the Pine Creek Power Company, and not more efficient.

Dump.

The most serious obstacle with which the property has to contend is that of inadequate height for dumping. The sluice empties into Pine creek, and is about 15 feet above the creek bottom, and even at the end of this, the first season, the creek was almost dammed across by the tailings, which were piled up so high as to require, for a large part of the time, the use of a small monitor to free the sluice outlet.

This matter is receiving the best attention of the management, which intends this coming season to install some sort of a tailings elevator for the removal of at least the coarse tailings. The finer material would probably be taken care of by the creek in flood.

One very noticeable feature in the working of this pit is that the monitors are always kept so placed as to *drive* the dirt; one is used to undercut when necessary, and very little ground-sluice is used. The clay is washed by the monitors up against a pile of boulders near the mouth of the sluice, and so disintegrated.

This system of working is unusual in the district, and, under the circumstances, is certainly much more efficient than squirting square against the face and trusting to the back-wash and ground-sluice to carry off the material. The duty obtained from an inch of water has thereby been materially increased, and with, apparently, no accompanying disadvantage.

The number of men employed as a regular force, besides the manager, is:—Two foremen, 4 pipers (total 6, 3 on each shift); 8 general work; 1 ditch tender; 1 carpenter, part of the time. A large force was, of course, employed in opening up the pit.

The British America Dredging Co., Ltd.

The British America Dredging Co., Limited, of which O. T. Switzer is the manager in Atlin—and whose head office is 764, Bullitt Building, Philadelphia—this past season began to operate the dredge which was brought into the camp during the season of 1903. The dredging scheme, as at first formulated by W. J. Robinson and associates, contemplated working certain leases on what is locally known as the "Poor Farm," that is, certain deposits of loose modern gravel occurring in the present valley of Pine creek, near its mouth, and some two or three miles below the falls on the creek. This gravel, which is said to be eminently suited for dredging, did not carry as high values per yard as a number of other deposits in the camp, which latter, however, may not be as amenable to dredging as the former.

Subsequent to the ordering of the dredge, but before its installation, the company secured the *Ophir Group* of leases on Gold Run—a draw in the Pine creek valley parallel with and on the south side of that creek, and about nine miles up from the mouth—and on this ground, instead of on the "Poor Farm," it was decided to place the dredge. This decision seemed to be justified by the very substantial return of which this ground gave promise, if it could be handled by some appliance such as a dredge, for it had been pretty thoroughly tested by drift workings from shafts 20 to 35 feet deep and had been shown to be sufficiently rich to pay wages for even this costly mode of operation.

The general scheme included the establishment of a central power-plant, just below the falls on Pine creek, at which point electric power would be generated, and from there transmitted, at high voltage, to a number of dredges, which it was intended eventually to operate on Pine and Spruce creeks. Up to the present there is but one dredge in operation on Pine creek and one under construction on Spruce creek.

Power Plant.

This central power-plant was built on Pine creek, a few hundred yards below the falls, on a flat near the creek, and on the north side. The plant is exceedingly compact and simple, is very efficient and has been well put together, with no display, the construction being business-like in all particulars. Some little trouble, due to foundations insufficient in such gravelly soil, is reported to have been had at first; but this was subsequently rectified by placing a substantial concrete substructure. When visited, everything was found to be running in first-class order. The power-house is a timber building, covered with corrugated iron, and in this are installed two power units, which can be operated separately or together. Each unit consists of a 24-inch turbine, of a nominal 500 horse-power, having a Lombard automatic governor, made by Stillwell and Bearce, Dayton, Ohio, and directly connected to a Westinghouse 3-phase alternating motor of 180 K. W. and 1,100 volts. So far, only one unit has been required, the other being in reserve.

The water for power is taken out of Pine creek above the falls, and conveyed by a ditch along the side-hill to a point opposite the plant, discharging into a pressure box about 187 feet higher than the turbines. From here it is conducted to the plant by a steel rivetted, slip-joint pipe-line, diminishing from 30 inches to 24 inches in diameter, and about 1,900 feet long. The pipe-line connects with a heavy, wrought-iron distributing pipe, equipped with relief valves, and from this water is supplied to the turbines through separate pipes, provided with gates which can be opened or closed as desired.

The plant has been found to operate most satisfactorily and has given very little trouble. Some difficulty was at first experienced with the automatic governors, as the water for their operation was taken from the main pipe, and contained so much grit and mud as to interfere with the delicate mechanism and adjustment of these machines. Oil was subsequently substituted as the medium of operating the governors, since when the trouble has disappeared and the regulation effected has been very satisfactory.

Although little difficulty has been experienced with the plant proper, a good deal of trouble has been caused by the filling up of the ditch and flume with sediment from the hydraulic operations further up the creek, and although sand-traps have been in use, they were not enough to catch the fine silt, which finally settled in the ditch, filling it up to such an extent as to require a man a considerable part of the time to shovel it out.

The electric current is "stepped up" at the power-house, from a voltage of 1,100 to 22,000 at which voltage it is conducted to the dredge site by a pole-line between five and six miles long, equipped with copper wires. At the dredge site there is a transformer house, where the current is again reduced to 1,100, and then again to 400 volts, at which voltage it is used on the dredge, being conducted thereto by an insulated and waterproof cable. The maximum amount of power which can be used by the dredge is about 220 horse-power, or less than half what can be generated by one unit of the power plant, and such an amount of power is seldom called for, as the motors are seldom all in use at any one time.

Dredge.

The dredge scow is about 96 feet long, 40 feet wide and 6½ feet deep, drawing about 4 feet of water. The dredge machinery is operated by electricity and is of the Bucyrus type, that is to say, it is a most substantially constructed chain bucket elevator, having on the chain some 96 buckets of 3 cubic feet capacity each, and, normally, should run at a speed of 18 to 20 buckets per minute. The bucket ladder is a most substantial steel-trussed arm, capable of reaching 20 feet ahead of the dredge and to a maximum depth of 44 feet, although, in this instance, bedrock is only about 28 to 30 feet below the level of the water in the pond. The buckets deliver their contents into a revolving screen of heavy boiler-plate, with holes varying from 1 inch at the upper end to 4 inches at the lower end. The oversize boulders from this screen are dumped over the side on to scows and taken away. The screenings pass through into a tail apron-sluice about 120 feet long, provided with iron Hungarian riffles. Provision is made for taking the finer material to gold-saving tables, which, together with about 90 feet of the sluice, are supported on an independent scow. These tables were found, however, not to be in use, but all the material which passed through the various sized holes of the screen, up to 4-inch holes, after having been once separated, was mixed again and run through the same sluice at the same time, a practice not usually considered the best.

The motors installed and in use on the dredge were as follows:—

75 horse-power motor, driving ladder and buckets.
50 " " 10-inch cent. pump supplying water for sluice.
30 " " 8 " " " sprays
20 " " driving revolving screen.
20 " " driving winches for moving scow.
5 " " pumps for general purposes.
Also electric light plant.

The whole plant has been most substantially constructed, the workmanship and materials are of the best, and the installation has been all that could be desired. Whether the design is that best suited for the material being handled is open to question, but it must be remembered that the plant was originally designed for the conditions existing at the "Poor Farm." The plant was erected under contract by the Western Engineering Company, and is a creditable piece of work.

The ground selected to be dredged underlies a small, almost level, flat, a few feet above the drainage level of Gold Run, where an artificial pond has been made to float the dredge. This last season much time was lost and expense incurred in getting the pond opened out for work, as the tailings had to be dumped on land and removed by horses. This should cease as the pond becomes larger, when they will be dumped behind the dredge. The face of the cut is reported by Mr. Switzer to have advanced about 200 feet. The width of the cut was at first 150 feet, but was subsequently reduced to 100 feet. It was estimated that the amount of dirt handled during the season was about 25,000 cubic yards. The superficial deposit is loose gravel, easily moved, underneath which is a deposit of gravel and boulders cemented in a stiff hard clay, and supposed to be a continuation of the "yellow dirt" found lower down the creek, although the colour is not so marked. It is, of course, impossible to inspect directly the deposit being dredged, since it is under muddy water, but its character may be inferred from that of the adjoining drifting propositions. In these the clay, though it weathers on exposure to air, is, when first exposed, tough, if not hard, and tenaciously holds the boulders. This is the gold-bearing stratum, and the gold is chiefly near the bedrock, which is uneven, but not so hard as to be undredgable.

Great difficulty was experienced in working this deposit with the dredge, since even a small boulder set in such clay and projecting, was just a big tooth to "chew up" the dredge buckets, and this it did most effectively, for at the close of the season the lip of every bucket had been so dented and bent in as to render them practically useless for cutting a bank. The lip on every bucket will require to be replaced before next season. These lips were originally of manganese wrought steel, 1 inch thick, and it is the intention of the Manager to replace them by lips made of 1½-inch steel.

The damage to the buckets was practically the only one sustained by the plant during the season—a very creditable showing for the plant, considering the strain to which it was subjected, being often brought to a stand-still by contact with some imbedded boulder. This damage is reported to have been done in the first month's run.

The ground proved to be so tough that towards the end of the season the management adopted the policy of putting a series of holes into the bank with a keystone drill in advance of the dredge. These were loaded with dynamite and fired electrically, and this did much to loosen up the ground. The full efficiency of this scheme was not demonstrated, since, when it was tried, the bucket line was in such a dilapidated condition as to give little criterion of what might be done with the ground so broken up, but it unquestionably was a great assistance, even under the existing conditions.

The gold-saving apparatus, however, left much to be desired, in illustration of which Mr. Switzer reports that in the fall, when dredging out the tailings to form a shallow bottom on which to rest the dredge for the winter, a considerable yardage of this material, which had already been through the gold-saving appliances, was passed over the portion of the sluice, only some 30 feet in length, on the main dredge scow, and yielded about as much gold as had the original dirt.

The bed of Pine creek opposite "Gold Run" has not been found to be gold-bearing, the run of the gold-bearing gravels having apparently been through Gold Run, which enters into or is cut by Pine creek at about the point where the bridge on the waggon road crosses the creek. At this point Pine creek was found to be gold-bearing, and here was seen about the only placer mining done in the bed of the creek during the past season. This work was being carried on by Green & Co., who employed a small force of men, and are reported to have obtained results which left a fair margin of profit. The stream had been diverted to one side and pits sunk from 10 to 20 feet to bedrock. Operations were carried on with the aid of Chinese pumps and a derrick operated by power from a water-wheel.

Green & Co.

When the ground was visited, however, nothing of the actual operations could be seen, as the pits had been allowed to fill up, and preparations were being made for drifting during the winter on the Gold Run deposit where it comes out into the cutting made by the present creek.

The deposit of Gold Run crosses, as described above, from the south to the north benches of Pine creek, locally known as "Tar Flats." These low, flat northern benches form the valley bottom of Pine creek, and are from 30 to 40 feet above the creek, being underlain, to a large extent at least, by the yellow dirt deposit, which is at this point at a level slightly lower than the bed of the creek.

This ground is for the most part held under lease by the B. A. Dredging Co. and is worked by individuals on the "lay" system, a royalty of from 15 to 20 % of the gold obtained being paid. Commencing at the creek, these individual miners have run in 15 to 18 tunnels, reaching bedrock, either by shaft or inclined tunnel; while, further back from the creek, drifting has proceeded from two or three vertical shafts, which have been sunk to bedrock.

In a letter recently received from Mr. O. T. Switzer, of the B. A. D. Co., he says his company intends to install a steam shovel on Tar flats during the season of 1905.

Trouble is experienced from water at all seasons except after the "freeze up" in winter, and, consequently, work in this section is confined to this season, the dirt being brought to the surface and washed when water is available. The miners get winter work at living wages, after paying the royalty to the lessor. Among those so operating are Alexander Ross, C. E. Gilmore & Co., and others.

GOLD RUN.

As has been already noted, before the advent of the dredge on Gold Run a considerable number of drifting propositions were worked from shafts sunk to bedrock. The dredging company bought up a number of these individual claims and on such ground installed the dredge. Immediately above the dredging company's ground there are several of these drifting propositions still in operation.

Thomas & Brown.

Of these, Messrs. Thomas & Brown hold four claims (250 by 250 feet each) immediately adjoining on the east the dredging company's ground. A shaft has been sunk to bedrock, a depth of 38 feet, and from this, by a system of levels and breasts, a considerable area of ground has been mined out from bedrock up to a height of from 4 to 6 feet. The dirt is loaded into wooden buckets at the working face and trammed on flat-cars to the shaft, where it is hoisted by hand to the surface and there washed, when convenient, in a 12-inch sluice-box, with water brought by a wooden flume from the N. C. G. M. Co.'s ditch.

This property is considered the "model" drifting mine of the camp, and certainly the work has been carried out with a neatness and system, combined with the requisite technical knowledge that renders the mine a credit to the owners. The shaft is lined throughout with sawed lumber, so carefully jointed and so regular as to look like one piece. The collar has been raised sufficiently above the ground to admit of a dump, and to bring it above the level of the sluice-boxes, which here have to be raised up on trestles, as the ground surface is practically level.

The windlass is of wood, about 8 inches in diameter, most neatly set up, with a rope brake and iron cranks, and is double acting; that is, an empty bucket is lowered while a full one is being raised, a practice seldom seen in British Columbia, yet so simple and effective as to be worthy of note. The hoisting rope is steel, about ⅜-inch in diameter. The buckets hold about two cubic feet. On the surface is a shed containing a small vertical boiler, which supplies steam to a small pump under ground, which is ample to keep the mine drained.

Altogether, the work has been most systematically carried out, and while the intrusion of surface water has forced the abandonment of several adjoining propositions, in this mine the timbering has been kept in such good shape that there has been no break in the roof and the surface water has been excluded.

The sluice-boxes are of the ordinary style, provided with the ordinary pole riffles and a few iron ones. A system of undercurrents has been provided, however, which was the only one seen in use in individual work in the camp. This undercurrent and gold-saving table is made with the same neatness and judgment which characterises the rest of the work about the mine. A sketch drawing of the arrangement accompanies this report.

Mr. Thomas informed the Provincial Mineralogist that he found the gold chiefly on bedrock; that he found he could make 1½ ounces of gold to the set pay a profit; and that one man could mine two sets per week.

Martin & Clark.

Immediately above Thomas & Brown's claims, to the east, L. B. Harris has a 100-foot claim not being operated, and to the east of this Martin & Clark have three claims. In November, work here had been closed down for the season, but it was seen that the property had been worked by a vertical shaft some 32 to 35 feet to bedrock. A small steam hoist had been in operation, the boiler also providing steam for a steam-pump underground. Sluice water was obtained from the Ruffner ditch.

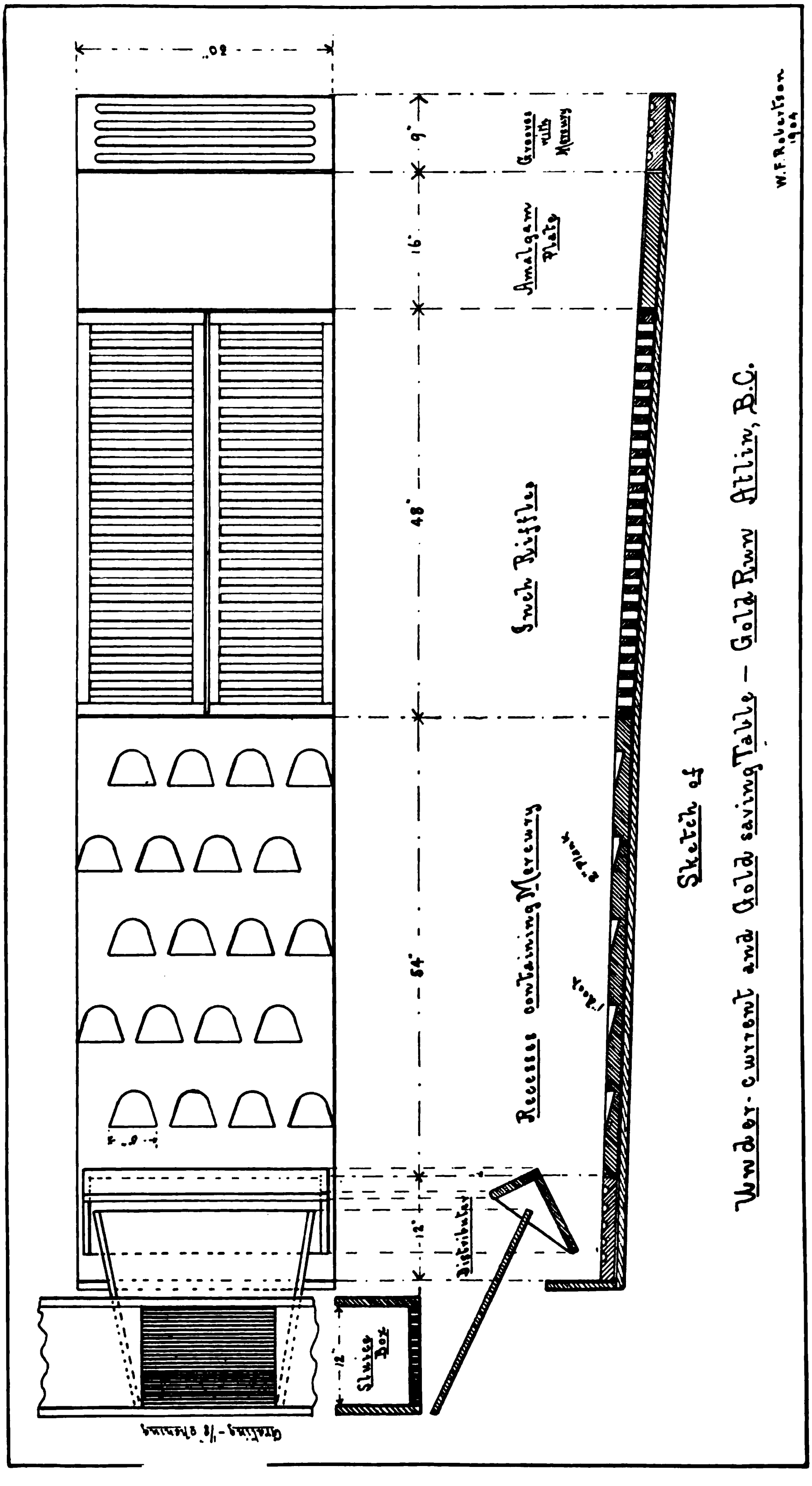
L. B. Harris.

Immediately to the east of the last-mentioned property, Louis B. Harris has two claims. This property was also temporarily shut down, the caving of the ground to the surface having admitted more water than could be pumped out.

It was reported that the main drive had been run upstream from the shaft 100 feet, and the ground stoped out for four sets wide to the south of this. Bedrock was slightly deeper than on Martin & Clark's property. A small vertical boiler and hoist were in place, and four men, who had secured a "lay" on Harris' 100-foot claim below, already mentioned, were using it to run a circular saw to cut lagging.

Stukey & Co.

To the east from the preceding claims, Stukey & Co. are mining on a partnership basis. They have one creek and two bench claims. The property had been worked with six men during the summer months, and though it was temporarily idle when visited in November, it was intended to resume work



Sketch of

Under-current and Gold saving Table – Gold Run Atlin, B.C.

during the winter. A vertical shaft had been sunk 35 feet to bedrock, from which drifting had been done eastward across the claim, and the ground had been mined for 22 sets to the south. A small vertical boiler and hoist were in place, covered by a suitable house. It was understood that 173 ounces of gold had been taken out from July 6th up to time of closing, about the first of November.

Kent & Co.

Still to the eastward on Gold Run, Kent & Co. have some six claims, which were operated during the winter of 1903-4, and up to June, 1904, when work was stopped for the summer; but it is reported that work will be resumed during the coming winter.

From Gold Run eastward to Surprise lake, the valley of Pine does not contain any working properties. A good deal of prospecting has been done in the way of shallow pits, but nowhere have these proved successful in finding gold in paying quantities. This is not to be wondered at, since the yellow deposit, the most fruitful source of gold on the creek, has been shown, near Gold Run, to be at a level considerably lower than that of the present creek, and, consequently, has not been cut by upper Pine creek. At the point where Boulder creek enters into the valley of Pine, bedrock is too deep to be reached by any other method than drifting from a shaft.

Black & Grant.

Messrs. Black & Grant, about a year ago, sunk a shaft on the north side of Pine creek valley and on the west side of Boulder creek, where the valleys intersect, some 200 yards from the flats. The ground is included in the leases held by the "Société Minière," or, as locally known, the "French Company," and has been obtained by the present operators under a "lay," which includes not only the 1,200-foot plot now being worked, but also an option to work further ground to the south. Bedrock was found at a depth of about 60 feet, with a slope to the south of from 5 to 7 per cent. From the shaft, drifts have been run to the north for approximately 450 feet, and ground to the width of 100 feet along the drive had been mined. The dirt is loaded into cars at the face and in these is run to the shaft, where the car is hoisted in a cage and run over a track to the sluice-boxes.

The ground was heavy and required very careful and costly timbering, which is found to be one of the heaviest items of mining cost. One "cave" had been experienced about a year ago, but the drift has been run around this and no serious damage was felt, further than that there was an increased influx of water, which, however, is not prohibitory in amount. The timbering has been well done, and the mining has been done systematically and well. It is gratifying to be able to report that the yield of gold has been sufficient to leave a substantial surplus after all charges against the property have been paid.

The surface plant consists of a water tube steam boiler and hoist, with a small extra boiler, used only when the water is excessive; all housed in a substantial shaft house, which also serves as a timber-framing shed.

The deposit being mined is peculiar. The bedrock, as best it could be seen, was similar to that exposed in the hydraulic pits further down the creek, and dipped with the flow of Boulder creek. Lying on this is a deposit of clay with little or no sand or gravel, in which is imbedded angular fragments of rock with comparatively few water-worn boulders, all so placed as to indicate that it was not deposited in running water, but rather as was the yellow dirt already referred to, or that it was a slide from the adjacent hill. The colour is a dull gray, not the yellow of the "yellow deposit," and the level at which it occurs is much higher than would permit it to be a continuation of the gold-bearing deposit of Pine creek. Indications point to its origin being a slide. This bedrock deposit varies from 2 to 6 feet in thickness where worked, and appears to be the gold-bearing stratum. Above this is a deposit of loose, fine, water-worn gravel and sand, clearly a deposit from the creek, not cemented together, for which reason much trouble is experienced in holding it up, as it is apt, if it gets a chance, to run down between the lagging.

The manager, Mr. Black, pointed out that the pay was entirely in the bedrock deposit, which is the only portion being mined, and that the upper deposit is practically barren.

BOULDER CREEK.

Of the smaller tributaries of Pine creek, Boulder continues to be the most important. For some distance up from its mouth, the ground, including the benches, is held by "La Société Minière de la Colombie Britannique," a French Company, of which Mr. Henry Maluin is the local manager. In the lower part of the leases, great difficulty had been experienced in providing "dump" for the tailings, the comparatively flat grade of the creek bed necessitating the use of very long sluices, which were expensive to keep up. As the work proceeded up the creek, however, the grade increased to such an extent that in a short time height enough was gained to enable the tailings to be piled on ground which had been worked out.

Work for the season had finished when this property was visited, and no details of the season's work were obtainable. The ground is reported to be rich and, with the question of dump settled, should become profitable. The property had been worked from June to October in 1904, washing an area of ground approximately 200 by 100 feet.

Bedrock is lower than the bed of the present creek, and, consequently, where hydraulic work is in progress the stream has to be flumed. The bedrock deposit here is of the same class as is found in the lower drifting propositions, looking more like slide material than like gravel wash, and is here about 10 feet thick, being overlain by 15 feet of loose boulders and gravel, above which is 20 feet of fine silt, and above this again is some 100 feet of fine sand and gravel.

Above the French Company's ground a number of individuals and small partnerships are working the benches from creek level, the creek bed proper being about exhausted, and they report satisfactory results. Bedrock here is about 15 feet below creek level, the dirt being shovelled into sluices and the boulders piled either by hand or with the aid of a derrick.

The creek is being pretty uniformly worked up as high as *Nos. 20 and 26 Above Discovery*, where C. D. Newton is operating a small hydraulic proposition, with satisfactory returns. The wash here is largely granite, with many large boulders. Work is carried on directly in the creek bed, and as the boulders are very numerous, and the grade is not sufficient to allow of their being carried off, they are piled up. A substantially constructed sluice, with blocks and with a branch running from it, has been laid; and while work has this season been carried on in a small way, Mr. Newton is so well satisfied with the value of the ground that he proposes operating on a larger scale this coming season.

Below this, on the creek, Charles Taylor, Garrison, and Clarke and Sutherland had been working during the summer season, and are reported to have done well.

RUBY CREEK.

Ruby creek flows into Surprise lake from the north about three miles from the outlet. This creek was formerly held by certain parties under leases, but these leases were allowed to lapse, when the ground was staked as "claims" by individual miners. These men have been working the claims for the past year, and report having obtained values sufficient to work the creek by hand.

The creek was not visited by the writer, as work had then ceased for the season, but he is informed on reliable authority that the miners have jointly driven a long bedrock drain, with cross-cuts, and that an area of ground, estimated as over 3,000 acres, has been prospected, with the results mentioned.

BIRCH CREEK.

Atlin Lake Co.

The lower portion of Birch creek is held by the Atlin Lake Hydraulic Company, of which Mr. A. Bryan Williams is local manager. This company originally purchased in 1900 a large number of claims from individual miners, which they consolidated for the purpose of establishing a hydraulic mining enterprise. Operations for the season of 1904 were suspended by October, and the details of the summer's work could not be obtained on the ground, but from personal observations afterwards, it appeared that about 400 feet of the creek channel had been washed to bedrock for a width of 50 feet.

The face of the cut indicated a depth of wash of about 20 feet, consisting of two layers of well-washed gravel, separated by a bed of "slum." Boulders of considerable size are rather plentiful in the wash. The grade of the bedrock in the creek is ample for all purposes, and though bedrock is hard, it is not very difficult to clean.

The operations of the company are greatly hampered by the very limited water supply available, the topography of the creek permitting the construction of only a small dam, which retains water for but a few hours only. From this dam a flume leads down the eastern side of the creek to the pressure box, the water being led to the workings in a steel pipe, and used through two monitors having 6 and 7-inch nozzles.

SPRUCE CREEK.

Spruce creek is the principal tributary of Pine, entering it from the south-east about two miles from Atlin lake. For about two miles above its junction with Pine, that is, up to about *127 Below* or opposite Stephendyke on Pine creek, the two streams are close together, running about parallel, with little more than gravel hills separating them. There seem to be strong indications that at one time Spruce and Pine joined at this point, viz., two miles higher up than at present, both creeks then keeping a north-westerly course, and that the present channels of both creeks below this point are of comparatively recent cutting.

In neither stream below this point has gold been found in quantities to pay for working, and such as has been found is accounted for by the breaking through of the recent channels, and the carrying down by the water of the finer gold.

Spruce Creek Power Co.

Proceeding up the creek, the first workings found were those of the Spruce Creek Power Co., operated by Denny & Blaine, of Seattle, located at about *127 Below Discovery*, that is, just about opposite the Stephendyke flats, on Pine creek. Here extensive hydraulic operations had been carried on during the summer, work having been suspended before October. The ground being worked was a bench on the left or south side of the creek, the bedrock rising from the creek at a moderate angle, and consisting of much the same character of rock as that found in the Pine Creek Hydraulic workings. The bench or bank being worked had been opened up with a face along the creek of from 300 to 350 feet, and had been worked back for about 125 feet.

In October, much loose material had fallen from above, somewhat obscuring the face, which appeared to consist of a bedrock deposit of blue dirt, similar to that found in the Pine Creek Power Co.'s. pit, and here from 10 to 15 feet thick, over which lay from 25 to 30 feet of fine silt or "boulder clay," and above all ran a heavy layer of fine loose wash, or "chicken feed," as the miners call it, which increased rapidly with the steep surface of the hill, which here reaches a height of 200 feet.

One of the original owners of the property, who visited it with the writer, informed him that the values were all found in the blue channel dirt and within four or five feet of bedrock. This pay dirt appears not to follow the bend in the present creek, but to cut across under the point of the hill, coming out again into the creek some half a mile further up. This has been practically demonstrated by several drifting mines higher up the creek, one of which, drifting from the present creek bed in rock, cut through the "rim" into the old channel, which is now being mined. It would appear, therefore, that the operations are being carried on on what is practically the outlet of an old deep channel, here coming out of the hill.

The water supply is derived from Spruce creek, being taken out at about *No. 17 Below*, and carried by a ditch along the north bank of the creek to a point about half a mile above the workings, where it is carried across the valley of the creek by a rivetted iron inverted syphon to the top of the gravel ridge which is being washed. Here it is again delivered into a ditch and flume and carried to a pressure box some 180 feet above the workings. The pipe from the pressure box starts with a diameter of 22 inches and is reduced to 16 inches at the pit. One No. 6 and two No. 4 monitors were used. A supplemental water supply, used as a bye-wash, is taken out of Spruce at *No. 100 Below*, and is brought down the north side of the creek in a ditch and carried over the creek to the pit by an aqueduct.

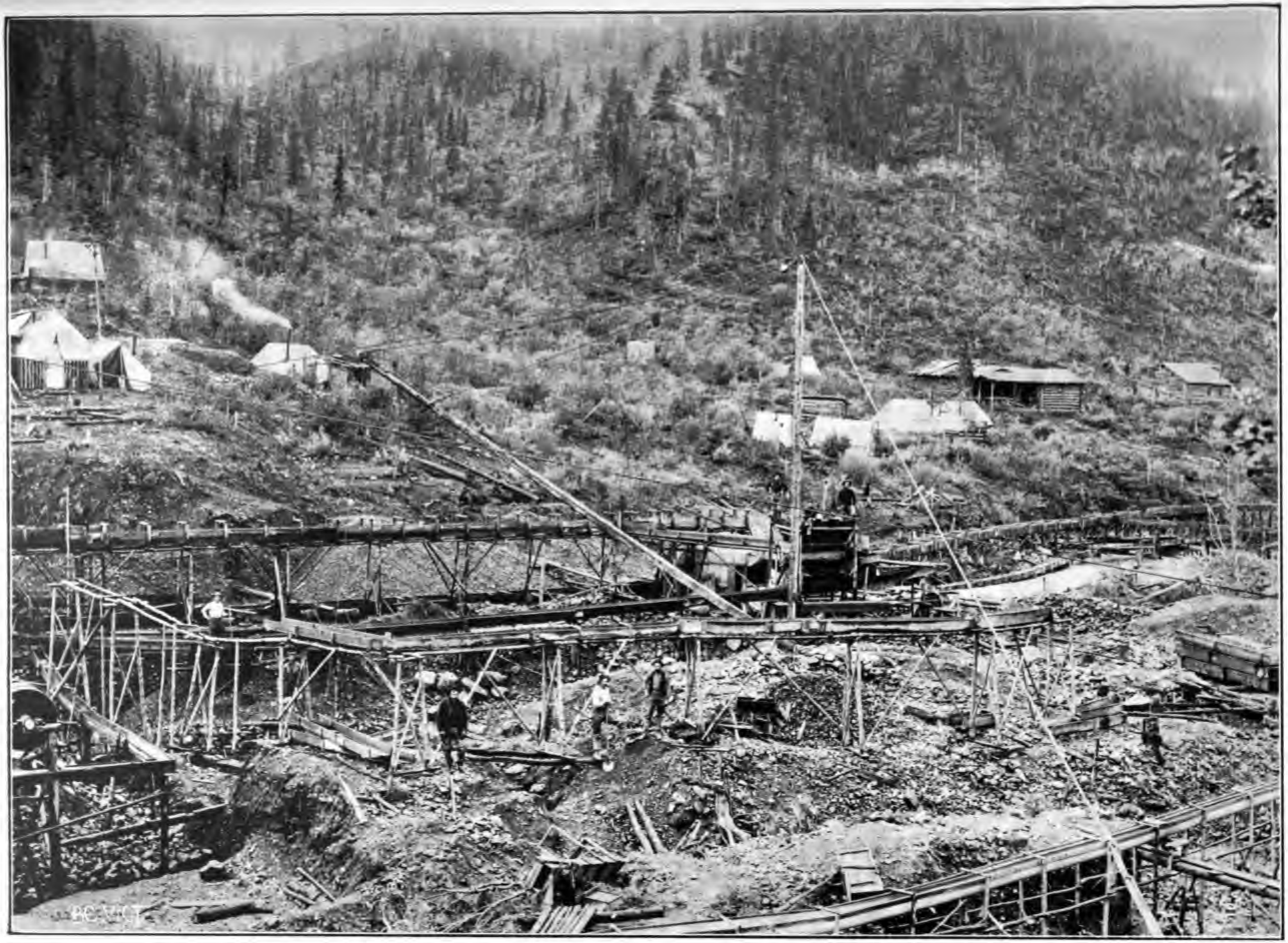
This is the first season of operation for this company, and the pit is scarcely yet in shape, while several details in the water supply will require to be improved.

Spruce creek is the stronghold of the individual miner and of mining partnerships. Bedrock in the creek bottom above the last-mentioned property begins to get comparatively deep, so that it remained unworked during the first years of the camp, when only the more accessible diggings were touched. Of later years these deeper workings have been worked quite extensively, with bedrock 20 to 25 feet deep, the ground being rich enough to stand the expense of such operations.

These creek workings, which extend along the creek for about one-half to three-quarters of a mile, are mostly on 100-foot square claims, or on several of these amalgamated, and are, as a rule, equipped with derricks worked by undershot or overshot wooden water-wheels, which wheels usually also serve to operate Chinese pumps for unwatering the pits. The greatest trouble met with has been the shortage of water for power, and of room to dump tailings, with an increasing amount of seepage in the pits, which latter difficulty has been overcome in the lower group of pits by keeping open a drainage ditch on bedrock.

As far as could be learned from the operators, these workings about averaged wages for help employed and for other expenses. There are one or two enterprises now on foot with the object of handling the dirt in a more economical way, by the installation of steam shovels, and to the use of this class of machine the ground seems admirably adapted. The steam shovel possesses various advantages over the dredge, which is the machine used elsewhere in the district. It is more easily moved, cheaper to install, and, the bedrock being dry, can be cleaned up in the usual way and all the gold can be recovered; and the last, but by no means the least, advantage, the operator can see what he is doing, and can so avoid boulders, loosening them either by hand or by blasting. It is probable that the coming summer will see at least one of these machines installed.

About five miles above the Spruce Creek Power Co. plant, W. F. Gore, acting as superintendent for an Eastern company, was operating a hydraulic plant washing the bed of the creek and the bench to the south, at a point just above the canyon. The plant is equipped with a fine water supply under good pressure. The ground, where worked in the creek bed, is reported to have been fairly good, but values did not extend either up or down the stream. This location is between two canyons, and experience has shown that old pay channels do not follow through canyons, but must be looked for in the hills on either side. The limited amount of pay dirt met with would indicate such to be the case here, and there is a strong



PLACER MINING IN 1904 ON SPRUCE CREEK, ATLIN.

probability that such old channel only crossed the creek here, and that exploration of the bank to the south will expose its outlet. If it be found sufficiently above the creek bed to form a dump, this ought to put the property in a very good position. Prospecting in this bank to the western end had revealed a rimrock rapidly rising, with coarse gold in small quantities, but sufficient to give encouragement.

Towards the upper end of the creek, approaching the Blue canyon, the valley flattens out, leaving wide flat stretches covered with gravel wash of varying thickness, in which some prospecting has been done with fair success, but on which there are not as yet any producing claims.

Just below this canyon the valley narrows, rimrock being visible on either side, the wash being from 8 to 12 feet deep, with numerous heavy boulders through it. Here a number of individual miners were working this past summer, making about average wages, and while the ground is fairly rich, it is difficult to work on account of these boulders.

Spruce Creek Dredge.

A number of these claims have been purchased and consolidated by the British Columbia Dredging Co., a Philadelphia syndicate, allied with the British America Dredging Co. The syndicate has brought in and is installing on these properties a large dredge of the Bucyrus type, much more powerful than is the one on Pine creek, and which, when operated, will be supplied with electrical power from the power plant on Pine creek. About two-thirds of the necessary machinery has arrived at Atlin, and most of this has been taken to the ground by teams. The hull of the scow, the timber for which was brought from the coast, was more than half finished when work was suspended for the season. It is the intention of the company to form a pond to float the dredge by building a dam across the creek valley; and this work has been started. The pole line from the power plant to the dredge site is up, and ready for stringing the wires. It is estimated that it will be at least the end of 1905 before the dredge is in operation. The construction of this plant also is in the hands of the Western Engineering Co., of San Francisco.

On Spruce creek, much more than anywhere else in the camp, the "yellow deposit" assumes a shape resembling an ancient channel, being comparatively narrow, and bounded by defined rimrocks. This channel, while comparatively straight, has been cut and re-cut by the present stream, which takes a more tortuous course, although the general direction and wider boundaries of both are identical. At and just below each of such cuttings of the old channel, the modern stream carried gold in workable quantities, while at other points it did not, indicating that, to a large extent at least, the gold of Spruce creek was derived from this old channel, the bed of which was at an elevation superior to that of the present creek for a considerable distance up. Each of these cuttings exposed the end or side of the old channel, and on these exposures a number of drift mines have been run in.

McKee Creek.

McKee creek drains a small section of country, triangular in shape, between Spruce creek and O'Donnel river, and flows into Atlin lake from the east, about 10 miles south of the town of Atlin. A fairly good waggon road has been built from Atlin to the creek, near its mouth, but any heavy material is transported by the lake, on scows in summer and on the ice in winter. The creek is short and has a steep grade, averaging about 11 %, and this is a great assistance in the mining operations. The creek gravels contain an unusually large number of boulders, which proved a great trouble to the economic working of the creek by individual miners.

Amalgamated McKee.

The lower stretch of the creek is being operated by the Amalgamated McKee Hydraulic Mining Co., of which Mr. F. T. Hamshaw is local manager. This company is, as the name implies, an amalgamation of the properties of the Atlin Mining Co. and of the McKee Consolidated, and as such was worked last year. The company has this past year been working a strip of the south bank of the creek above the canyon, where it owns the first bench only, the ground back of this being reported as held by other parties. In this bench is evidently the old channel of the creek, containing a deposit very similar to the old yellow deposit of Pine creek and carrying very good values. Mr. Hamshaw had stopped work for the season when the property was visited, and the details of the summer's operations were not obtainable.

It was ascertained from the former manager of the Atlin Mining Co., who had worked last year the strip of ground immediately in front of that worked this summer, that the ground ran from $1.10 to $3.30 per square yard of bedrock. The property is reported to have produced in 1902 about $24,000, in 1903 $48,000, and in 1904 about $52,000.

Water for hydraulicing is obtained from the creek above, and is brought on in a flume 40 inches wide by 30 inches deep, giving a head of 350 feet at the lowest point.

This company is operating two pits, the lower opposite the old *Discovery* claim, and here hydraulicing has washed away a strip about 600 feet long by about 150 feet wide, with a depth of wash varying from about 10 to 30 feet at the face. The upper pit appears to have been opened up only this past season.

Very little further work seems to be going on in the bed of the creek, but from the hydraulic pit as far up as the forks of Eldorado creek, there are a number of individual miners at work in the south bank in the same "old channel," and they are reported to have made fair profits this year.

On the main creek, just above Eldorado creek, the Consolidated McKee Creek Co. has been operating a small hydraulic plant washing a high bench, but is having considerable extra expense, as it is obliged to impound the tailings, since the creek claims immediately below are not as yet worked out.

Mineral Claims.

Quartz mining in the Atlin District has not yet reached the productive stage, and, as a matter of fact, prospecting for mineral claims has not received the attention it deserves, partly from the fact that the remoteness of the district would entail cost for transportation of ore outwards or supplies inward, which would render ores of ordinary grade impossible to work, and partly from the fact that placer miners are not quartz prospectors, and the quartz prospector has not as yet taken hold of the district. Still, for all this, there have been a large number of mineral claims located in the district, a few of which have received some material development. The records of the Atlin office show that in 1903 there were 57 locations and 112 certificates of work issued for mineral claims, while in 1904 some 105 claims were recorded and 122 certificates of work issued.

Imperial Group.

The greatest amount of work done on any group of claims in the Atlin District has been done on the *Imperial Group*, or, as better known locally, the *Munro Mountain Claims*. This group is situated on the southern flank of Munro mountain, overlooking the valley of Pine creek, and is some five miles from the town of Atlin, a good waggon road running to the base of the mountain. These claims were fully described in the Report of 1900, at which time considerable work had been done and was in progress by the Nimrod Syndicate, which, however, suspended operations shortly afterwards; since which time, according to Mr. Featherstonhaugh, under whose superintendence the work was done, little further underground development has taken place. In 1902 some work was done on the property, chiefly on the surface, which confirmed the underground workings. No work was being done on the properties in 1904. The following account of the work previously done is given, as the results obtained from this more developed property have a bearing on the probable value of similar veins in the vicinity.

As stated in 1900, a distinctly marked quartz vein from 1 to 8 feet wide, averaging aoou 30 inches, cuts the hillside in an easterly and westerly direction. This vein was tapped by a cross-cut tunnel some 30 feet below the outcrop, and drifts amounting to about 100 lineal feet were driven thereon.

In the immediate vicinity of the *Imperial Group* several other locations occur on the same or similar quartz ledges, but none of these have received any serious development, nor has any ore from them been treated.

The range of hills lying to the north of Pine creek valley, on which the *Imperial Group* is situated, is cut by numerous quartz veins, and between Birch and Boulder creeks a number of these have lately been uncovered and developed to some extent. These veins seem to have a general N. E. and S. W. trend, dipping nearly vertical, and have, as far as may be judged from development work done, the appearance of being permanent and regular. The veins occur in highly altered sedimentaries (classed by the Geological Survey as the "Magnesian Rocks" of the district), in greater or less proximity to the granite mass lying to the north, and, while the rule is not advanced as uniform, it is a fact that a number of these quartz veins are accompanied by, and often in contact with, light-coloured acid dykes, apparently finely porphyritic in structure, very much weathered and soft on the surface, and often containing in such outcrops more gold than does the solid quartz beside them.

The development done has not as yet proven whether this gold is the result of the decomposition and concentration of the quartz ledges, or of placer gold washed into the decomposed outcroppings, or whether these dykes, as is quite probable, are not at least the carrying medium, of the gold which is found in varying quantities in the adjacent quartz ledges. This latter theory is strengthened by the fact that certain very similar dykes, uncovered by the operations of mining on Pine creek, do contain an appreciable amount of gold occurring as a constituent part of them.

About 100 feet lower down, a second cross-cut tunnel was run in for 75 feet, where it cut the vein, on which drifting to the extent of 75 feet was done,

Prior to 1900 some 270 tons of rock were treated in a small five-stamp mill then situated at Atlin. This ore was from the upper levels and the management reported it to have yielded about $7 per ton, the gold being free. A subsequent lot of 25 tons from the lower levels was treated similarly, and yielded less than $3 per ton. The quartz in the vein was so crushed that much of it could be mined with a pick. The assays from the upper tunnel were reported as over $10, but in the lower tunnel they were much less.

The following extracts from the Report of A. H. Bromley, M. E., to his Directors has been furnished by Mr. Featherstonhaugh:—

RESULTS OF MILL TESTS, IMPERIAL GROUP.

Lot No.	Wt. Tons.	Yield per ton.	Location in mine from which ore was taken.
1	60	$ 6 52	No. 1 tunnel, west drift.
2	63	12 57	" "
3	51	6 12	" " and east.
4	75	8 42	" " and winze.
5	25	3 15	No. 2 tunnel, east and west drifts.
6	78	4 84	No. 1 " west stopes.
7	20	1 97	" " "
	372	$ 7 05	

Lake View.

Travelling along the range of hills from Birch creek eastward, at an elevation of from 800 to 1,000 feet above the level of Pine creek, the first point at which work has been done on this series of quartz veins is on the *Lake View Group*, containing the *Lake View*, *Grand View* and *Last Chance* claims, owned by J. Woods, J. Downing and W. R. Brown, of Atlin. These claims have been surveyed as a preliminary to applying for a Crown grant, but were not being worked when visited. There are several quartz veins on the properties, all approximately parallel and running in a general north-east direction, but the work done has been confined to two of these veins. An adit tunnel has been run in on the largest of these, which has a width of from 2 to 4 feet, with good free walls, and which appears to be following closely a dyke of the character already mentioned. The quartz is very white, containing a very little mineral in the form of iron sulphides, with occasional patches of galena, while a little free gold is sometimes visible, but the values are chiefly on the sulphides, or in gold not visible to the eye.

Some 300 to 500 feet to the north-east of the tunnel and higher up the hill, two inclined shafts have been sunk, in either the same, or a parallel, quartz vein, which here seems to dip more into the hill. The shafts had not been in use for some time and could not be entered, but, judging from the dump, were probably in the neighbourhood of 40 feet deep. The veins here still continue regular. The quartz is somewhat more iron-stained than in the tunnels, but this is probably due to surface staining. The property had been under bond to an English syndicate, whose local director informed me that on large average samples taken while developing, he had obtained assays running about $8.40 to the ton, mostly as free gold.

White Star Group.

Continuing along the hillside from the *Lake View* group frequent outcroppings of quartz are visible, and on one of these are the workings of the *White Star* group owned by Capt. Hawthorne, of Atlin. On this group the most important work consists of a cross-cut tunnel about 25 feet long to the quartz ledge, which has been followed by a drift to the east for 60 feet, disclosing a vein of quartz about 5 feet across, dipping to the north at an angle of about 80°, and having a strike N. 55° W. (mag.). The walls of the vein are particularly well defined and free, and the quartz presents a distinctly banded appearance, more particularly towards the hanging-wall side, where there is "paystreak" some 6 to 8 inches wide, while towards the foot-wall side the quartz becomes dull white. The mineralisation is slight, chiefly iron sulphides with a very little galena, and most of the gold is probably free.

The owner had been unable to get any assays on the ore and could not give any exact figures as to values found. I personally did not take any general sample for assay, recognising the difficulty of getting a reliable sample with a small pick. Hand samples from the tunnel, assayed by the Government Assayer in Victoria, gave results varying from nothing to $7.60 in gold per ton, while a certain sample containing a small quantity of galena gave $2.40 in gold and 9 oz. in silver per ton. There are several open cuts on the property, and outcrops of quartz, but the most satisfactory development is in the tunnel already mentioned.

Sunbeam Mineral Claim.

Still further to the eastward, along the same range of hills and on the west slope of the cross valley of Boulder creek, further quartz veins have been exposed on the *Sunbeam* mineral claim. This claim was located this past summer by Probasco and is now held by Probasco, Clark, Kappele, Henderson, *et al.* The location is about opposite *26 above Discovery*, on Boulder creek, and at an elevation of some 600 feet above the creek. The hillside is here covered with a heavy gravel wash which completely hides any quartz veins which might come through the underlying country rock.

The location was made through following up quartz float in the wash. A trench was dug across the general trend of the formation for 120 feet in length, from 4 to 10 feet in depth, and not over 2 feet wide at the bottom, which exposed the quartz ledge. When visited, the banks of the cut had caved in somewhat, although the owner had tried to clear out the cut for inspection, so that only an imperfect view could be had of the solid formation. The trench appeared to cross-cut first, for 20 feet, the soft decomposed outcrop of a light-coloured dyke, and adjoining this on the uphill side (north) a large quartz vein, of which some 8 feet could be seen actually exposed. This quartz is very white and free from sulphides, but appears to be part of a large regular vein.

Some 20 feet above the exposure, more quartz was uncovered, here much darker in colour, and whether this was the upper part of the same vein as exposed below or a separate vein, could not be seen, as the intervening space was covered with gravel. Only the locator had worked on the claim and he had not broken into the outcropping, so it was found impossible to get a representative sample of the ledge without putting in a shot. On the edge of the cut was a pile of quartz, probably broken loose from the ledge, and of this general samples were taken for assay, which gave small values in gold. The locator claims to have had several very high assays from samples taken when the cut was clear. These samples seem to have been taken from or near the contact of the dyke and quartz, and while it is quite probable that the dyke may prove to be gold-bearing, it is impossible to determine this until it has been exposed to a depth below the reach of surface decomposition and consequent possible surface enrichment from the placer gold in the overlying gravels. It was recommended that a small stream, easily available, be turned into the cut to sluice it clear; by which method as much could be accomplished in a week as the locator had accomplished by hard work all summer.

There is little doubt but that all the quartz veins exposed between Birch and Boulder creeks belong to the same series, since they are approximately in line, and have about the same strike and general characteristics.

Red Jacket.

The *Red Jacket* mineral claim on Pine creek, about *Four Below Discovery*, was located in 1899, in the bed of the creek, having been discovered in the working of the placer ground at this point. The Nimrod Syndicate sunk a shaft about 50 feet deep on the property in 1900, and reported good values as obtained, but the company got into litigation and work was stopped. The property has since passed into the hands of Mr. J. M. Ruffner, of the North Columbia Gold Mining Company, who, in 1902, ran a cross-cut from the shaft for about 100 feet. Since then it has not been worked and is filled with water, which it is difficult to keep out owing to the location of the shaft.

On the surface the values appeared to be in a decomposed quartzose dyke, but from the dump it would appear that the work done has followed a quartz vein occuring in a serpentine rock. In the quartz on the dump free gold was visible, and Mr. Ruffner showed the writer a sack of quartz in which gold was visible in nearly every piece. The claim is equipped with a small steam hoisting and pumping plant, and it is understood to be the intention of the owners to continue the work in 1905.

Rock of Ages.

The *Rock of Ages* is another claim on which the lead was discovered through placer working in the bed of the creek, and a shaft was there sunk meeting such serious difficulties from water as to practically lead to the closing of the mine, until such time as the lead is traced into higher formation and there developed. No work was being done on this property in 1904.

The shore of Atlin lake where the wide valley of Pine creek enters, in the vicinity of the town, is chiefly composed of magnesian rocks, cut by numerous small veins of quartz, and from this, on the surface at least, assays in gold can usually be had, and in several spots considerable work has been done to determine whether the values continue with depth.

Anaconda Group.

The first of these operations was on the *Anaconda Group*, worked in 1900 and fully described in the report of that year, where the values appeared to be in the soft magnesian rock rather than in the quartz, and, according to the statement of the management, were not found to continue to the depth of a small tunnel run in some 25 feet below the surface. The work was, therefore, abandoned and the property has since remained idle.

Beavis Group.

To the north of the town about one mile, a number of locations have been made in a very similar formation, although the quartz vein appears to be somewhat larger. Of these, the most developed is the *Beavis Group*, consisting of three claims, the *Gold*, *Gold No. 2* and *Sydney*. The group was reported to be under bond to Wynne Johnston and associates, of Skagway, who have already done some work on the property, and intend doing more this coming winter. They also sacked and shipped a certain amount of ore as a test lot. When visited, the shafts were found to be lagged up, at least down to the water level, and the vein could not be seen therein, but from surface showings, the dump, and the evidence of a miner who was present during the progress of the work, it is safe to say that there is a pretty well-defined quartz vein, averaging about 18 inches wide and apparently accompanied by a light-coloured acid dyke, such as previously mentioned, both of which are mineralised with iron sulphides, and which carry gold in varying amounts.

At a point some 300 yards from, and 200 feet above, the lake, Beavis had put down a shaft for some 20 feet on the vein. About 150 feet further to the north-west, and apparently on the strike of the lead, Johnston sank a shaft about 65 feet deep, from which drifting on the vein had been done for about 100 feet, with a cross-cut to the north-east 20 feet long, which is said to have cut a second quartz vein 4 feet wide. The quartz from the two shafts appears to be generally similar, and is mineralised with iron sulphides, in places to a considerable extent. The quartz taken from these shafts had been piled on the dump, and from this, the ore shipped as a test lot had been carefully sorted out, the actual result of which test has not been made public.

The writer took general samples of these dumps as they lay, being assisted therein by Mr. Wm. Gass, the owner of a similar and adjoining claim, who knew the ore and who tried to select ore such as went to make up the trial shipment. These samples were assayed by the Government Assayer, whose results indicate the presence of gold, but not in sufficient quantity to admit of shipment.

Gold Star Group.

The *Gold Star Group* of five claims, owned by Wm. Gass *et al.*, adjoins the *Beavis Group* on the east, and is in very similar country rock, except that it is somewhat more cut up by dykes. Here the quartz veins seem to have a general east and west trend, and are more split up into veinlets, which are correspondingly more frequent. A shaft had been sunk for 35 feet on a particularly well silicified portion of the formation. This shaft was partly filled with water and could not be entered, but the quartz therefrom was still on the dump. This was sampled by Mr. Gass, one of the owners, in the presence of the writer, and the sample was handed by him to the Government Assayer, who reports it to contain to the ton 50 cents in gold and $\frac{3}{10}$ ounces in silver.

Ottawa Group.

Still further to the east and about two miles from Atlin is the *Ottawa Group* of six clams, owned by the Shirley Bros., of Atlin, on which a shaft has been sunk to a depth of 36 feet, timbered for 16 feet down, and a drift therefrom driven 18 feet. These also were filled with water, so that the formation underground could not be seen. From the dump, however, it would appear that the country rock was still the magnesian rocks already mentioned, and here cut by a dark-coloured irony dyke, much altered and seamed by small quartz stringers, reported by the owner to have given assays of about $5 to the ton in gold. The writer, together with Mr. Shirley, took a general sample from the dump of the lead matter, which showed low gold contents.

Full Moon M. C.

The Shirley Bros. also own and have done some work on the *Full Moon Mineral Claim*, formerly the *Anny*, about one mile east from Atlin. Mr. Shirley reports the ledge to be running east and west, and to consist of a number of quartz veinlets cutting through the same class of magnesian rocks, over a width of about 7 feet. This was sampled by Mr. Shirley, and the sample brought by the writer to the Government Assay Office at Victoria, where it was found to contain a small amount of gold and about $\frac{3}{4}$ ounce of silver to the ton.

A brief visit was made to the south end of Atlin lake, the steamer "Scotia" being engaged between trips for the purpose.

Laverdiere Group.

The *Laverdière Group* consists of four claims, the *French*, *Alvaine*, *Holy Cross* and *Broughton*, the first three having been Crown-granted. The group is situated about two miles from the deep water of the lake, on the left bank of Hoboe creek, a creek which flows down from the glacier into West Bay. The general country rock in the immediate vicinity of the claims is a clay shale, with limestone appearing a little higher up the steep mountain side. What appears to be a very large igneous dyke, felsitic in character, cuts up through the shales at least to the limestone, and this dyke is very heavily mineralised; so much so that it appears in places almost completely to replace the dyke matter. The mineralisation occurs possibly as a segregation of the metallic sulphides and oxides which took place at the time of the formation of the dyke.

A tunnel has been driven in on a heavy segregation of this sort, at an elevation of some 20 feet above the level of the flat valley of the creek. This tunnel was found to be in about 185 feet, and had developed a very large body of mineral, by far the largest seen in the Atlin district; in fact, the tunnel was in mineral for most of its length. The first 20 to 30 feet of this tunnel was in almost solid iron sulphides, which seemed gradually to change into equally solid magnetite, through all of which there were minute stringers of copper pyrite, with copper carbonates near the surface. Towards the inner end of the tunnel the felsitic rock appeared in patches, but did not cut off the magnetite, merely rendering it less solid. The uniform character of the mineralisation was very striking, and it is certainly a most exceptional body of mineral. The ore from the tunnel had all been saved and was found piled up in cribwork at the tunnel mouth. This ore pile was carefully sampled over all accessible portions and the sample, representing the general average of the tunnel, was quartered down by the Government Assay Office, giving, upon assay, low values in copper, with traces of gold and silver.

Copper Island.

A landing was made at Copper Island to inspect the deposit from which several slabs of metallic copper had been obtained. Mr. Laverdière was present and pointed out the spots from which these were taken. The island here rose steeply from the water's edge, and the formation was found to consist of a bed of volcanic ash or tuff cemented together with lime. Through this were a number of calcite veins a few inches in width, in which in spots bright native copper was seen, and it was from these veinlets that the slabs of copper referred to had been obtained. These veinlets, while exceedingly interesting, are not sufficiently large, nor does the metallic copper in them occur in sufficient quantity, to be of importance commercially.

The enclosing rock shows green stain and contains little nodules which were suspected of carrying copper, and it is thought that the copper in the veins had leached out from the enclosing rocks. Samples of the rock from the immediate vicinity of the copper-bearing veins and elsewhere, were, consequently, taken for assay, but were found not to contain an appreciable amount of copper.

Union Group.

It was not found possible to visit this group, which is situated near the glacier at the foot of Atlin lake, but a hand sample therefrom was obtained from Mr. L. W. Sageman, one of the parties interested, which consisted of quartz and copper carbonates. This sample was assayed and found to contain: Copper, 6.1%; gold, 0.03 oz.; silver, 91.4 oz. per ton.

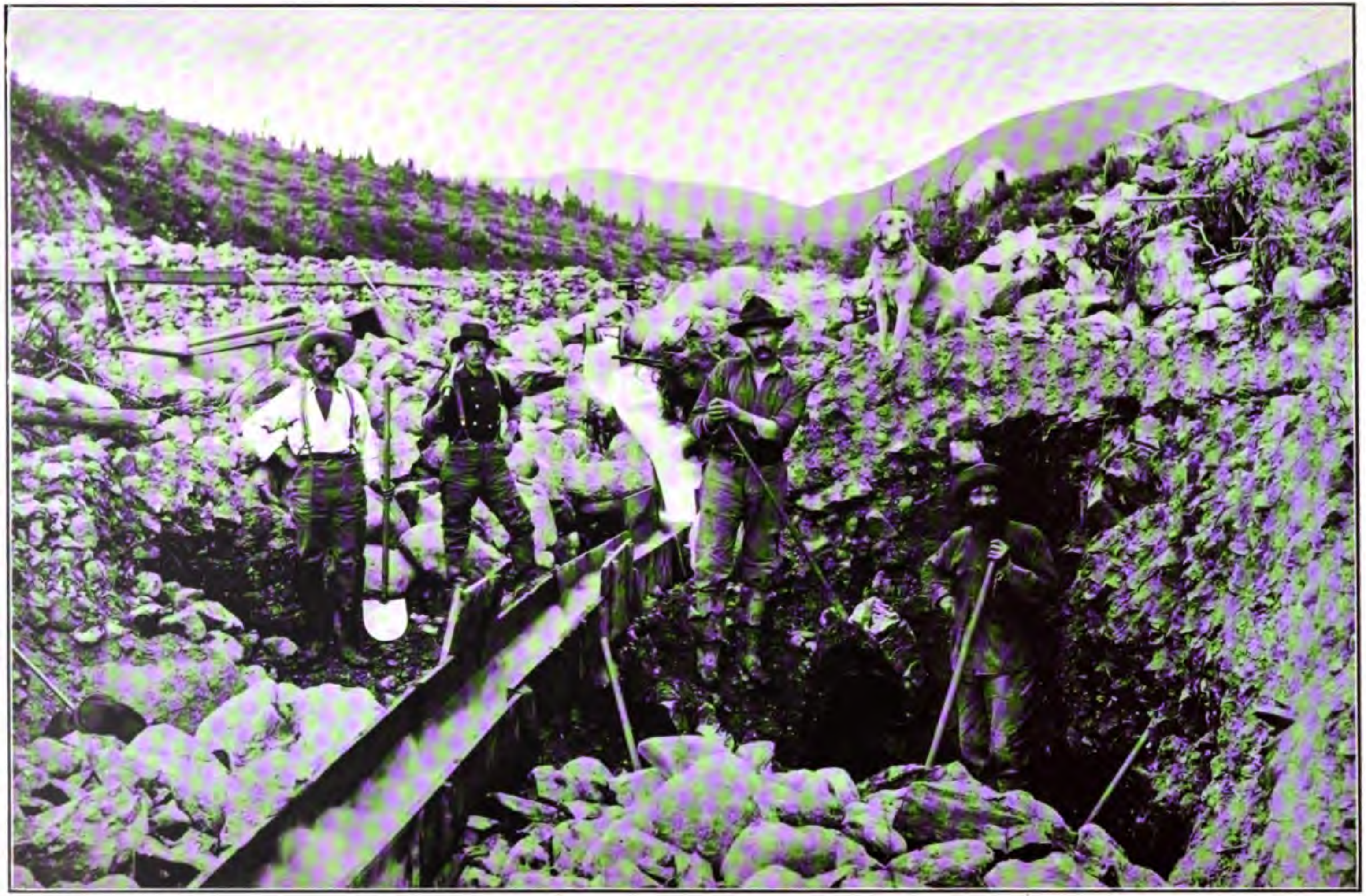
TAKU ARM.

On October 19th a heavy wind storm, lasting all day, prevented travel by water, but this dying away in the evening, a canoe was obtained at Taku, and the writer made a start at 8 p.m., paddling all night along Taku inlet, through the Golden Gate, and southward therefrom for a distance of nine or ten miles, down Taku arm, to the *Engineer Group*, on the east shore of the Arm.

Engineer Group.

This group, which consists of some 13 claims, was located and a good deal of work done on it prior to 1900, since when considerable money has been spent on its development by the Engineer Mining Co., of Skagway. The claims, which have not as yet been surveyed, extend along the lake shore and inland part way up the mountain, covering the bench-like foothills, which are some 400 feet higher than the lake. The property has not been worked this past year, and there was not even a caretaker on the ground.

A tunnel, driven in to cross-cut a large body of quartz outcropping on the bluff above, had been started below the level of highest watermark, and had, in consequence, been flooded by the spring floods. The tunnel ran in straight for about 200 feet, and at a point 175 feet from the portal a drift had been made to the right for about 115 feet, from which exploratory cross-cuts, etc., had been run to the extent of about 75 feet in all. The tunnel had cross-cut through slate, cutting in its length several small quartz veins, and the main vein was developed by the drift which showed the quartz to be from 7 to 20 feet wide. This main quartz lead continued in the drift for about 80 feet from the tunnel intersection, when it seemed to disappear into the wall, and the subsequent exploratory workings had not picked it up again, except as small stringers. The quartz is white and vitreous in appearance, showing very little mineralisation, while samples therefrom gave only a trace in gold. The tunnel had been laid with steel rails, and well equipped with cars, blacksmith shop, sheds, etc. This is the largest showing of quartz



INDIVIDUAL PLACER MINING—BOULDER CREEK, ATLIN.

seen on the property, but is not the showing for which the stamp mill was brought in. That showing is located some 600 feet further to the south along the beach at the original point of discovery. Here, a small stringer of quartz at right angles to the general trend of the larger quartz vein—viz., east and west—cuts from the shore into the hill, on which from the beach a shaft had been sunk for 30 feet, and from this shaft it is reported most of the rich samples taken from the property were obtained. Where this stringer should cut the hill, and 100 feet above high water, a three-compartment shaft had been sunk for 70 feet. This was well equipped with a Joshua Hendy steam hoist and locomotive boiler, all covered over by the frame of a fine building, which had never been completely boarded in, but was left unfinished, with tools lying where last used.

Just below, near the beach, has been erected the frame-work of a stamp-mill and bins, all excellently built, but only half completed, while on the beach in a cabin is apparently the complete machinery for the mill which has never been erected.

Gleaner Group.

The *Gleaner Group* is situated on the mountain side directly above the *Engineer Group*, and in almost identical geological formation—slate and shale cut by quartz veins of irregular continuity. There was a large surface showing of quartz 7 feet wide, to strike which at a depth of 100 feet, a cross-cut tunnel had been started and run in for 180 feet, but had not as yet encountered the main ledge of quartz which outcropped above.

No work had been done on the property in 1904. The writer did not personally go to the property from the *Engineer Group*, the above information being supplied by one of the owners, then present, who had worked the property.

White Moose Group.

This group of claims is situated on the west shore of Taku arm, nearly as far south as the entrance to the West arm of Taku arm, and about opposite the *Engineer Group*. The property is now held by a local Atlin syndicate which is trying to develop the property with very limited capital. The claims extend for some distance along the shore and have not been surveyed, so the boundaries of the various claims could not be distinguished.

A landing was made at the most northerly of the points at which development work had been done, and from this point the trial shipment, referred to later, was made. Here on the beach, between high and low water, a quartz vein, about a foot wide at this point, outcropped through the gravel, having an east and west strike, and cutting into the bank some 15 to 20 feet away. From this outcrop, as far as it could be reached from the surface during low water, there had been broken out about 1860 pounds of sorted ore, which was sacked up and shipped to the Tyee smelter at Ladysmith, where it was sampled and assayed, with the following return, given by one of the owners:—

Copper	7.36 %	Antimony	1.37 %
Silver	50.34 ozs.	Arsenic	trace.
Gold	0.78 "	Silica	59.81 %
Iron	6.51 %	Lime	1.35 %
Zinc	3.85 %	Alumina	3.22 %
Lead	4.79 %	Sulphur	10.13 %

The lot yielding a net return of $41.92.

The character of the mineralisation is shown by the analysis. It was manifestly impossible to follow this showing down where it was found, so, on the strike of this outcrop, some 30 feet further inland and 15 feet higher on the bank, above the reach of highest water, a shaft was sunk about 30 feet to intercept the lead, which was found in place. The shaft could not be entered, but from the dump it was evident that the quartz here was not so heavily mineralised as on the beach, although there was more mineral visible here than at any other portion of the group. A rough general sample of the dump as it lay was taken and, when assayed by the Government Assayer, showed values in copper and silver.

From this first showing, proceeding south by a trail approximately parallel with the shoreline, but from 100 to 300 yards inland, a number of quartz veins were found upon which small test pits had been sunk. The quartz in all of these was white and vitreous and showed little visible mineralisation, and upon assay gave low values in free gold, and carried 2.5 oz. in silver. The country rock generally was shale, slate and schist, cut by occasional igneous dykes, often porphyritic in character.

Near a log cabin on the property, a tunnel has been driven in for about 160 feet, with the evident intention of cutting at depth a quartz vein which outcrops on the hill some 100 feet vertically higher up; this it has not as yet done, but may when driven further.

Still further to the south, on a high steep bluff, and approached by a separate trail from the beach, there is a large outcropping of quartz, apparently of a vein fully 6 feet wide and dipping into the hill at a very flat angle. To tap this at a depth of about 150 feet, a tunnel had been driven in some 150 feet, but this had been poorly timbered and had caved in so as to be impassable. As nearly as could be made out, this was on the *Rock of the Sunset* mineral claim. Little work had been done on the outcrop, but a sample, with difficulty broken off as best could be, and showing little mineralisation, gave upon assay 3.4 oz. silver per ton and slight gold values.

Magnesite Deposit.

A very curious and unusual occurrence of magnesite ($Mg. CO_3$) is found actually within the townsite of Atlin and less than a hundred yards from the Government office. The formation in the vicinity of the town is composed of the magnesian rocks already mentioned. On these rocks, overlain with wash, is the townsite, rising from the lake to a height of about 200 feet. Skirting the townsite on the rear—that is, the east—is a low depression or flat "draw," swampy in character, devoid of trees and in places showing "hummocks" of white magnesite which seems to be "growing up" from the swamp level; for certainly these deposits are constantly rising higher and higher, and now form mounds 5 to 8 feet above the swamp level. The deposit is exposed on the surface over several acres and is, when dry, perfectly white. It has been dug into for a depth of about 10 feet, and continues equally pure and clean from all foreign matter, such as clay or gravel, as on the surface. This deposit was at first considered to be simply an accumulation of magnesite formed from the decomposition of the surrounding rocks and deposited by surface waters in this swamp. If such was its origin, it seems incredible that the deposit should be so free from clay and other materials, equally portable by water, and that it should be deposited in mounds above the water level. It seems probable, therefore, that the deposit is not from water, but that underlying this draw some particular stratum in the magnesium rock occurred, which, being softer, was more easily worn away, so forming the draw, and being more susceptible to the action of swamp waters carrying carbonic acid, was altered from an oxide of magnesia into the carbonate of magnesia or "magnesite," in which operation it would be greatly increased in bulk and so rise in mounds, seeming to "grow up" from below. In this connection attention is drawn to the analysis, given further on, of a mineral spring in the vicinity.

The magnesite deposit has been staked as a mineral claim by A. C. Hirschfeld, of Atlin, who, during the season of 1904, dug from the surface exposures some 200 tons of the material, which was sacked and shipped to San Francisco, Cal., as an experimental lot. The transportation companies are understood to have given a rate of $8 per ton from Atlin to California, which apparently still leaves a margin of profit for the producers. It is understood that this shipment was intended to be used in the manufacture of "magnesia brick" for furnace linings. The remarkable purity of the deposit would seem, however, to render it applicable for other uses, and this would justify a higher price being paid for it than is at present realised.

"Mineral Industry" says that the consumption of magnesite in the United States in 1902 was 53,252 short tons, of which 49,786 tons were imported from Greece and Austria; the greater part of the home production came from California, where it is calcined and the calcined product shipped east to the principal point of consumption, Pennsylvania. The uses to which the mineral is put are given as refractory lining for open-hearth steel furnaces and converters, as a lining for rotary kilns used in the manufacture of Portland cement, and as a non-conducting covering for steam boilers and pipes. It is also used in the manufacture of paper stock by the sulphite process. A limited but increasing quantity of magnesite is used for the production of carbonic dioxide gas, which is liquefied under pressure and so sold. This is done either by calcination direct or by treatment with sulphuric acid; in which latter case, magnesium sulphate (Epsom salts) is produced as a by-product. The average price of calcined magnesite in 1902 in California was $15 a short ton.

The writer saw the magnesite being mined and no selection of the material was necessary; it was simply shovelled into sacks. A sample from the shipment brought by the writer to Victoria, and analysed in the Government laboratory, gave the following:—

Iron	trace.	Silica	1.12 %
Alumina	"	Carbonate magnesia (Mg. CO_3)	88.62 %
Sulphates	none.	Oxide (Mg. O)	9.44 %
Chlorides	"	Moisture	0.80 %

Mineral Spring.

Near the north end of the townsite of Atlin, and flowing out underground from the swamp in which the magnesite deposit occurs, is a mineral-bearing spring. In 1900, Mr. J. C. Gwillim, then of the Geological Survey, took some of this water to Ottawa for analysis, upon which Dr. Hoffman, chemist of the Survey, reports as follows:—

"This water was found to contain: Potassa, traces; soda, very small quantity; lime, very small quantity; magnesia, somewhat large quantity; ferrous oxide, trace; sulphuric acid, very small quantity; carbonic acid, large quantity; chlorine, very small quantity; silica, trace; organic matter, faint traces.

"The magnesia amounted, approximately, to 1.834 parts in 1,000, an amount which would correspond to 3.851 of magnesium carbonate, or 5.869 of magnesium bicarbonate. It is more than probable that it is to the water of this and similar springs in the vicinity that the deposits of hydro-magnesite occuring back of Atlin townsite owe their origin."

ATLIN MINING DIVISION.

REPORT OF J. A. FRASER, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report on mining operations in the Atlin Mining Division, Cassiar District, which now includes what were formerly the Bennett and Chilkat Mining Divisions, for the year ending 31st December, 1904.

As remarked in my last report, conditions here are continually changing, so that much of what is done in this District is of a tentative nature and results are difficult of anticipation. Some things foreshadowed have not materialised, and some disappointed hopes and expectations must be acknowledged; still, I think steady, if slow, advancement may be claimed for mining as a whole in this District. The snowfall of last winter and the cold, wet summer made possible a longer and fuller water supply than usual without the extreme high water, which invariably causes more or less damage and paralyses operations until it subsides. While fewer men were engaged in mining this year than last, the output has been larger and the revenue about the same. The success of drifting operations has contributed materially to this end and is an encouraging phase of the mining industry here, as it affords steady employment the year round with fair returns, and enables miners to remain in the camp during the long winter months, almost as profitably as in the busier summer period. From 550 to 600 men were engaged in placer mining this year, or not more than 700 in mining of any form, as against from 800 to 900 last year. Upwards of 250 men engaged in drifting operations this winter, which is probably 100 more than were so employed last winter.

This winter men are drifting on Spruce, Pine, Gold Run, Boulder, Ruby, Wright and, in a small way, on Birch and McKee creeks.

PINE CREEK.

As anticipated by the reports for the past two years, the individual operations on this creek this season were very light indeed, not more than 65 to 70 men on Pine creek and 20 to 25 men on Gold Run being engaged in mining, together with those employed by the various companies, making 150 to 175 men all told. The results obtained were, I believe, very satisfactory to the operators, very nearly as much being reported for royalty by the individual operators as by the companies.

Pine Creek Power Co.

Of the companies, the Pine Creek Power Company, Limited, F. T. Blunck, President, M. W. Loveridge, hydraulic superintendent, led the van on this creek for amount of work done. The returns were, perhaps, not all it had a right to expect from the known richness of its ground, still, I believe, results were profitable and satisfactory. This company moved over 130,000 cubic yards of gravel and stripped nearly 10,000 square yards of bedrock, using an average run of 2,000 miner's inches of water and considerable quantities of black powder and dynamite. The number of men employed ran as high as 36, with an average of 21 during the season. They operated two pits alternately, generally using two 7-inch nozzles and overflow.

From the cemented nature of the material, and particularly the hardness of the blue glacial deposit overlying the pay dirt, they found it expedient to use explosives, which was done by running in tunnels with T ends, in which black powder was placed and exploded by battery, with excellent results. The glacial deposit was difficult to deal with as it came down into the pit in large blocks which required "bull-dozing" with dynamite the same as boulders.

The remarkably uniform gold values and the extent of the gold-bearing yellow deposit (mentioned in former reports), wherein are found the best values, is such as to encourage the management to expect much better "net results" next season. It is hoped, by a different disposition of the pipe-lines, to get an increased pressure with more direct discharge into the pits.

N. C. Gold Mining Company.

The North Columbia Gold Mining Company, J. M. Ruffner, Manager, was mentioned last year as operating on Gold Run and on Stephendyke. Last winter, however, they acquired the property of the Eastern Hydraulic Mining Company, being the *Eastern Group* of six hydraulic leases situated on the south side of Pine creek. To the development of this property its energies were mostly directed, with very gratifying results, although the amount of gold recovered did not cover the expenditure, which totalled nearly $20,000. Much of this amount was spent in the enlargement and extension of water ditches, flumes, etc., and the construction of pressure boxes, roads, bridges, and works incidental to the opening up of new property.

On the *Stephendyke Group* of leases not much was done beyond the construction of a pressure box, a bedrock flume, and several hundred feet of open cutting for prospecting purposes. About $1,200 was expended in sluicing operations. The Company employed as high as 60 men at times, with an average of 8 on the *Eastern Group* and 6 on the *Stephendyke Group* for a good portion of the season.

Atlin and Willow Creek.

The Atlin and Willow Creek Gold Mining Company, Limited, under the management of Mr. F. H. Brackett, employed from 8 to 12 men on the south side of Pine creek, and won about $15,000 from a comparatively small area, and doubtless netted a handsome profit upon the aggregate expenditure.

B. A. Dredging Company.

The British-American Dredging Company, Limited, O. T. Switzer, General Manager, has acquired extensive interests in this district, and last season built a large dredge on Gold Run, which, while not completed in time to do any work, was still supposed to be ready to commence operations with the opening of this season. Upon starting operations, however, it was found that the electrical power plant did not work satisfactorily, and much time was lost in overhauling the plant and securing satisfactory service therefrom. As Gold creek, upon which the dredge was located, is but a very small stream, a pond had to be formed in which to float the dredge, and, as bedrock lies from 30 to 40 feet below the surface, this pond was formed by scooping out a shallow excavation and surrounding it with a dam, formed with the material excavated. Considerable difficulty was experienced in keeping water in the dam, but the greater difficulty was encountered in the form of a streak of yellow gumbo about 12 feet thick (deep), which was met with about 10 feet below the surface. This material was thickly intermingled with green serpentine boulders, and the mass was so hard and tough that the dredge made very slow progress through it, and until a pond sufficiently deep and large to accommodate the dredge was excavated below the common level, explosives could not very well be used without injuring the dam. Late in the season, when the excavation had attained the necessary depth and dimensions, this material was drilled (with a key-stone driller) and blasted, with such success that the Manager feels confident that he has solved the problem of operation and can make a good showing next season both as to the quantity of material handled and net profits therefrom.

The difficulties encountered in the initial operation of this dredge are the more regrettable as it was the first in the district, and the avowed intention of the management was to place several of those dredges in the neighbourhood. While the ground upon which it was placed is undoubtedly rich and carries good values for a considerable depth upon bedrock, it happened to be one of the most difficult spots in the district to operate on account of the gumbo.

The difficulties attendant upon the operation of this dredge prevented the company from placing another on Tar Flats (Pine creek), as was contemplated last year. Beyond some "lays" and prospecting work, nothing was done there nor on the *Race Horse* and *Feather Groups*. This company employed an average of 25 men during the season.

SPRUCE CREEK.

On this creek about 135 men worked during the season, besides those employed by the companies. Notwithstanding a scarcity of water, and the unfortunate litigation that for a time prevented a majority from working, the output reported by the individual miners very nearly equals that of last year, being over $90,000. Water and dump room are vexed questions on this creek. Water, because so much is needed for power purposes to run the pumps in use by the majority of the operators, and so many are drifting into the banks on either side who also need water for sluicing, all of which is independent of the requirements of the hydraulic companies who alone, towards the end of the season, would require all the water in the creek. Dump room is also at a premium because the pay gravel extends into the benches so far, and is so rich in many parts, that very good returns are realised by the miners, notwithstanding the cost and labour involved in getting it out to the creek bed, and the owners of bench claims naturally wish to work their ground, and as the creek claims are not all worked out it is at times very difficult to adjust and distribute the available dump ground to the satisfaction of all concerned. More dump ground is needed on this creek than elsewhere because it has been discovered that the pay dirt is so firmly cemented together that ordinary sluicing does not recover all the gold and, in many instances, ground that has been sluiced once and allowed to lie for some months yields better returns upon the second sluicing than upon the first, so that, where room is available the miners put out large dumps and allow them to lie during a portion at least, of the winter, to secure the benefits of disintegration caused by the frost.

About 125 men are drifting on this creek this winter, and as yet the width of the pay-streak does not appear to have been determined, although it is evidently over 700 feet in width. The difficulties now existing on this creek will, I think, largely disappear with the introduction of bedrock drains and flumes, and improved methods of operation which, I am pleased to say, are likely to be adopted.

Spruce Creek Power Company.

Of the companies, The Spruce Creek Power Company, Limited, under the management of Mr. E. F. Blaine, with Mr. Hays Haslitt as hydraulic superintendent, comes first. This company, which has acquired all the interests of the Consolidated Spruce Creek Placers, Limited, as well as other properties and interests, did considerable work this season but was hampered for want of water. A force of 16 men was employed by it during the season.

The Gladstone Hydraulic Mining Partnership, Wheelock and McCloskey, managers, being still hampered for dump and room for tailings, confined its operations to the extension of its water ditches for the operation of the *Gladstone* and *Gorgon* leases, and to prospecting the *Gladstone*, which was done by a shaft 36 feet deep, and drifts therefrom, with the results from which the management is thoroughly satisfied and is encouraged to undertake much more extensive development operation next season. A force of 17 men, with an average of 10, was employed during a part of the season.

The Columbia Hydraulic Mining Company, E. F. Meisner, manager, carried on prospecting work for a portion of the season but did not accomplish much, nor secure very satisfactory returns. From 8 to 15 men were employed during a portion of the season.

The owners of the *Crown Group* of hydraulic leases did some prospecting, with very flattering results, but have not yet undertaken the installation of plant which another season, however, will see well under way.

The property formerly held by the Camp Hammell Mining Partnership and the Blue Canyon Partnership, together with most of the individual holdings or claims between the *Crown Group* and the *Blue Canyon*, having been acquired by Mr. A. C. Denniston and some members of the British-American Dredging Company in the fall of 1903, very little mining has been attempted there this season, and not more than 12 to 15 men were engaged on that portion of the creek. The above-mentioned parties, however, having secured incorporation as the "British Columbia Dredging Company," have undertaken the construction of another large dredge—a 7½-foot, open connected type, elevator dredge. This company cleared the right of way and erected 7½ miles of electrical pole-line to connect with the British-American Dredging Company's power plant on Pine creek, excavated a basin for the dredge, transported over four hundred tons of material to the point of construction, and got the frame up and the work of construction well advanced, but owing to the lateness of the season, wet weather, etc., work was suspended somewhat early, to be resumed next season as soon as the weather will permit. An average of 32 men were employed in this work until closed down.

A number of hydraulic leases, or leases for placer mining purposes, under Part VII of the Act, have been taken up along Spruce creek, on several of which considerable prospecting work has been done, but not much more than would constitute assessment work, except in the cases already mentioned.

On Little Spruce, which is a tributary to Spruce creek, entering the same from the south about *140 Below Discovery*, some hydraulic leases were acquired last winter and, on a group of these, some development work was done, in the course of which a shaft was sunk 27 feet from the surface without finding bedrock. The last 13 feet were through a bed of blue cemented material, below which they again struck "wash gravel" carrying "pay," but, owing to lack of pumping apparatus and other necessary appliances, they closed down for the season after spending about $3,000. They intend sinking to bedrock immediately upon resuming work next season.

McKee Creek.

Only a small number of individual miners (12 to 15) operated on this creek this season, and the majority of those even were upon "lays" upon company holdings, but the reputation of the creek for "good pay" was maintained and, while all did fairly, some did exceptionally, well. While there is sufficient water in this creek for ordinary sluicing purposes, there is not enough to satisfy those operating hydraulic plants, and some difficulties arose between adjacent owners, which culminated in litigation, and perhaps affected the output for the season, inasmuch as it embarrassed and delayed some of the operators.

Amalgamated McKee.

Of the hydraulic properties on this creek the leases and interests of the Atlin Mining Company, Ltd., and of the McKee Consolidation were acquired by the Amalgamated McKee Creek Mining Company, under the management of Mr. Clarence M. Hamshaw, and, as threatened litigation was thus averted by common ownership of conflicting interests, a very good record was made for the season. This company uncovered about 8,000 square yards of bedrock during the season, winning therefrom about $42,000 and making the highest royalty returns of any operators in the district for the season—viz., $52,500, which included about $10,000 recovered by "lay" operations. This company employed an average of 17 men for the season, and, I am pleased to say, "netted" a handsome profit on the season's operations.

I may say that the difficulty in reaching the bottom of some of the old channels in this creek, the great amount of debris to be moved, and the scarcity of water, have suggested to the managers of this company the idea of installing a steam-shovel for picking up the pay gravel, after ground-sluicing off the comparatively barren top débris, dumping this into cars, operated by electricity, and conveying it to the lake shore (not far distant) for sluicing, where ample water and dump can be provided at comparatively small cost. The idea seems practicable and, if so proven, will introduce a method of operation that will solve to a great extent two of our greatest difficulties and render profitably workable several properties in this district of otherwise doubtful value.

McKee Consolidated.

The McKee Consolidated Hydraulic, Limited, F. T. Hamshaw, manager, whose properties lie higher up the creek than the last-mentioned, expended a considerable amount in flumes and waterways and exploratory work, endeavoring particularly to bottom some old channels which seem to be considerably deeper than the present channel of the creek. This prospecting work was not entirely successful, not having found bedrock, except on the "rim"; but sufficient gold was secured in what was done, to arouse great expectations when bedrock is eventually reached. The management expresses itself as very well satisfied with the prospects. An average of 16 men was employed until the middle of August, and of 10 men from then till the end of September.

BIRCH CREEK.

As mentioned in last year's Report, much more attention has been given to this creek by individual miners than in any season since 1899, and about 20 miners were operating above the hydraulic company's works, but with rather indifferent success—still, with sufficient to induce them to believe that the ground is rich enough to warrant the continuance of work. The possible shortage or lack of water is the greatest drawback they anticipate.

Atlin Lake Co.

The Atlin Lake Company, Limited, A. Bryan Williams, manager and superintendent, is the only company, so far, operating on this creek. Opertions were commenced by this company in April, and piping on May 6th, and continued until about the end of August, when, owing to the decrease in water supply and an anticipated further shortage, the operations were closed down for the season. The anticipated shortage did not occur, owing to a considerable rainfall, and sluicing might have been continued throughout September, but it was then too late to resume.

However, as it was, a force of from 12 to 16 men was employed, and about 30,000 cubic yards of gravel were moved, which yielded over $12,000, being much the best season the company has had, and securing for it, I believe, for the first time a "net" profit from the season's operations. I have reason to believe that everything is in very good shape for an early start next season.

BOULDER CREEK.

Owing to the unfortunate and expensive litigation, in the fall of 1903, between some of the miners on this creek and the Société Minière de la Colombie Britannique, which involved the disposition of their tailings and debris, and to some extent the use of the water, and which was decided against the miners (the decision in part taking the form of an injunction practically perpetually restraining those certain miners from depositing or permitting the deposit of debris upon the company's property), many of the miners either disposed of their properties or had them laid over pending a possible change to conditions more favourable to their interests, so that not more than about sixty men were mining on the creek this season, besides those operating on the property of the Société Minière de la Colombie Britannique. The results were as usual fairly good, and in some cases very good indeed.

Societe Miniere de la Colombie Britannique.

Of the companies operating on this creek the Société Minière de la Colombie Britannique, Henry Maluin, manager, Joseph Fall, superintendent, as usual, leads in the amount of work done. With a force of as many as 23 and an average of 17 men, over 50,000 cubic yards of gravel were moved, but notwithstanding that there was practically no embarrassment such as obtained the two previous seasons from the operations further up-stream, and that the company's operations were carried on at far less cost than formerly, the results were disappointing and not nearly as good as last season. This apparently can be explained only by assuming that the portion of bedrock uncovered was too smooth and therefore barren, but the management are still confident of better results next season, and consider themselves in good shape to secure them.

Black & Grant.

Although this company's hydraulic operations were unsatisfactory, the same cannot be said of the operations of Messrs. Black & Grant (J. H. Black and W. Pollard Grant), who have a "lay" upon a portion of the company's ground a short distance below the pit operated by the company.

This firm commenced operations about November 1st, 1903, by sinking a shaft nearly 60 feet to bedrock. The shaft is commodious and well timbered, and is operated by a steam hoist. The heaviest timbers procurable are required for posts, and caps in their drifts and tunnels. With all the care, an open seam permitted the creek to come in, early in June, which did much damage to the workings, actually compelling the suspension of operations for from two and one-half to three months. Within the year ending November 1st, about 15,000 cubic yards of pay dirt was hoisted, and nearly $60,000 won therefrom, the last two months' operations yielding nearly $14,000. This quantity of earth probably does not represent one-third of the quantity moved, as all rocks and boulders are systematically piled in the worked out portions, so as to provide permanent supports, as well as for economy of space and handling. An average of 35 men, besides those engaged above ground cutting and hauling wood and timbers for the mine, has been employed. They used about 700 cords of wood, at a cost of about $4,500, 2,600 sets of timbers and over 25,000 lagging, which together cost nearly $10,000. The cost and difficulties of operation have been formidable, and it is very gratifying to find such pluck and determination as they have shown rewarded by substantial profits. The success of these operations is instructive in demonstrating that high values are obtainable in the deep channels, of which I believe there are many in this district.

On the *Non-Union* lease, operated by A. H. Garrison & Co., with a small hydraulic plant, an average of six men (maximum nine) being employed, about 1,000 feet of water flume, and 800 feet of bedrock flume and pipe were laid, and about 8,000 cubic yards of gravel moved. The question of housing their tailings entailed some additional expense, as they built a tailings dam or crib, which, however, appears to serve the purpose very fully, and incidentally demonstrates that even on a creek possessing a heavy or steep grade such dams can be successfully operated.

RUBY CREEK.

On this creek from 12 to 15 men spent most of the season prospecting and four are drifting on it this winter. None have as yet got much past the prospecting stage and very little gold has been recovered, although this is the second season spent on the creek.

Of those operating on the creek, the Ruby Creek Mining Partnership, Limited, Robert Mackay, foreman, has done more work than the rest all told, having spent altogether over $6,000 in the two seasons. This season an average force of six men, with a maximum of eight, was employed and the open cut of last season was continued up-stream about 200 feet further, where a depth of 20 feet was attained. At this point a shaft was sunk 27 feet to bedrock, which was struck at a depth of 47 feet from the surface. The bedrock was found to be a quartz conglomerate, very much crumbled and broken. An excessive flow of water was found on bedrock which necessitated the use of pumping gear with more than the ordinary capacity of hand appliances, which being secured, permitted drifting on bedrock, and cross-cuts were run to an aggregate width of 50 feet. Still, this was not far enough to determine the width of the channel, nor even whether the deepest point had been found. Operations were suspended on account of the pump freezing up, the foreman assuming that winter was upon him. In sinking, however, from 25 to 30 feet in depth, "pay" gravel was encountered from which very fair prospects were obtained, some portions being very good indeed and far above the average of much of the ground being "hydrauliced" in the district. My impression is that this creek would make an exceptionally good hydraulic or steam shovel proposition, but is too deep for ordinary individual placer mining methods. Good prospects were found by the other operators, as far as they have gone.

WRIGHT CREEK.

On this creek about 20 men were mining during the season, with varying success, some doing very well indeed, while others hardly made wages. This has always been the history of this creek, some portions having been found very rich, while other portions were unusually barren. Two men are drifting on the creek this winter.

THE ENGLISH COUNTIES HYDRAULIC SYNDICATE.

C. Dubois Mason, manager, expended, through Messrs. Gierke & Co., over $4,000 on this property again this year, but, unfortunately, spent the greater part of the season contending with a hard barren cement, and only just before the close of the season did they strike the "pay" gravel peculiar to the creek, in which in the past the best values have been found. The operators think, however, that, now they have it, they can follow it, and are looking forward with sanguine expectations for the reward of their industry and their faith in the ground, which certainly has been very marked, and which, I trust, will not be unrequited.

OTTER CREEK.

On this creek the Otter Creek Hydraulic Company, Limited, did considerable work on the leases held under bond from Messrs. Carmichael, Moran *et al.*, but early in the season closed down, with, I understand, the intention of abandoning any further claim under the bond. The owners are still confident as to the value of their property, and claim that it is quite capable of profitable operation by properly utilising the available supply of water, the scarcity of which is the greatest difficulty.

SNAKE CREEK.

On Snake creek a number of leases were secured by local parties, but while it is their intention to equip the property with hydraulic plant, nothing has been done beyond some preliminary prospecting.

O'DONNEL RIVER.

On this river nothing has been done in the way of development, except at a point some 10 to 15 miles from its mouth, where the O'Donnel Syndicate, under the management of Mr. Robert McKee, did considerable prospecting and opened up high gravel banks which are represented as carrying good values throughout and as being an ideal steam shovel or dredging proposition. The whole river, practically, is located in the form of mining leases, and I have reason to believe that active development will be carried on next season at several points, with the probability of one or more dredges being located thereon, or at the least arranged for, before the end of the season.

On Bull creek (a tributary of O'Donnel River) the Bull Creek Hydraulic Syndicate operated during the season with a small hydraulic plant, and from four to six men prospecting their ground, and while no very rich ground was discovered, still some very fair values are reported and on the whole, it is claimed, the values would justify and repay operation by dredge or steam shovel.

GRAHAM CREEK.

On this creek no work was done this year for apparently no reason other than that the leaseholders were endeavouring to raise capital to equip the property with hydraulic plant, and did not succeed in time to commence operations this season.

There are other creeks in the district to which some attention has been paid during the season and on which some locations were made, but no development has been reported from any of them.

The season, on the whole, has been favourable and this fall and the winter up to date particularly so. It will probably astonish many to learn that open sluicing has been carried on, with very little interruption from frost, right up to the end of the year, particularly on Spruce creek and Boulder creek. With the exception of two or three short intervals, the thermometer has ranged between 10° and 36° Fahrenheit, and often for days (and nights) not dropping below 20° or even 25°. Some sluicing is carried on all winter by parties whose situation enables them to cover their dump-boxes with a tent or temporary cabin, so securing sufficient gold to pay at least running expenses.

There has been a falling-off in the number of claims recorded and re-recorded, which is partly due to so much ground being taken up in lease form, there not being much ground remaining unoccupied that is considered worth locating in 250-foot claims, and partly to the fact that several groups of claims have been consolidated into lease form. Of the ground held in lease form, I think that, outside of the consolidations of placer claims on McKee, Pine and Boulder creeks, very little indeed would be located in placer claim form, even if it were open for location, and as to the leases, or applications therefor, a considerable percentage of the latter will probably never be completed, and of the former I expect to have to recommend a goodly number for cancellation within the next few months, for non-fulfillment of conditions.

While the output of gold from the district is considerably larger than last year, a smaller amount in proportion has been reported for royalty, and while it seems impossible to get anything like accurate and full returns from the producers, I think the system of monthly returns, recently introduced, will materially increase the amount reported and incidentally the revenue legitimately due therefrom. It is difficult to secure returns from the small producers, particularly where their output is under $2,000, and it can never be done under existing methods and conditions, except by systematic solicitation on the part of some official appointed to call upon them where and when at work.

Mineral Claims.

I am again compelled to report very little activity in quartz mining, but, while very little more than assessment work has been done throughout the district, except upon a few properties. I have not observed any lack of confidence on the part of the holders of quartz properties, while on the other hand, the confidence of many seems to increase as development proceeds and better values are disclosed, as appears to be invariably the case.

Of the properties mentioned in former reports, nothing has been done on the *Yellow Jacket* for some months.

On the *Beavis Group* of three claims, just north of Atlin, considerable work has been done of an exploratory nature. A shaft was sunk to a depth of 66 feet and about 106 feet of crosscut tunnelling was done, but no shipments were made beyond certain small lots sent to the smelter for test purposes. From $4,000 to $5,000 were spent in development work, and the bondholders express themselves as quite satisfied and prepared to proceed as soon as arrangements are completed.

The *Imperial Group* of four claims on Munro mountain is also in a somewhat similar position, some work having been done during the year, although it is just now at a standstill.

The *Anaconda* and *Gleaner Groups* were allowed to be sold for taxes by their respective owners, and were promptly purchased by interested parties.

With reference to the *Engineer Group*, on Taku Arm, nothing has been done since my last report, as the company owning the property is in course of re-organisation, on a basis that will insure increased capital and development on a much more extensive scale than hitherto.

On the *White Moose Group* (Taku arm), some work has been done and a test shipment made, the returns from which, I understand, were very satisfactory, but nothing is being done at present.

While the above-named properties are not being worked at present, the owners in every case (except perhaps that of the *Anaconda*) express themselves quite satisfied with the value of their respective holdings and the possibility of their development into valuable mines.

Besides the properties above mentioned, considerable development has been done upon other properties throughout the district, as, for instance, the *White Star* and *Lake View Groups*, situated about 12 miles from Atlin, between Birch and Boulder creeks, and on the eastern slope of Boulder mountain. They comprise, in all, a block of about 10 claims, covering an area of about 500 acres. A good waggon road passes within a mile of them, and there are good pack trails to the camps. Work has been done on these properties as follows :—

On the *White Star Group* of three claims—An open drive, through country rock, 52 feet long and 5 feet wide, to tap the ledge. Tunnelling on vein, 58 feet long, 5 feet wide, and 6½ feet high. The ledge is 4 feet wide and assays from traces of gold to high values in gold and silver.

The *Isabel* and *Barbara* mineral claims—A surface cross-cut exposes the No. 1 ledge, which is 100 feet wide. A tunnel to tap the ledge at fifty feet is in course of construction. Mining work done amounts to 1,140 cubic feet. Assays from $3 to $6.

The *Lake View Group* of three claims—Besides various shafts and surface cuttings, a tunnel 151 feet long, 4 feet 6 inches wide, and 6 feet 6 inches high, has been driven to prospect No. 2 vein. The dump from the tunnel contains about 140 tons of ore. This property has lately been surveyed.

To facilitate mining operations, the amalgamation of these properties is contemplated.

Development is also being prosecuted, by Mr. George Pollay, on certain properties on Wright creek, by Mr. Henry Nicholson and others on Little Spruce creek, and by Shirley Brothers and Conley, and Rorke & Company, within two or three miles to the north of Atlin, where the prospects obtained are considered encouraging. On the last-mentioned property I understand that this winter's development work has exposed quite a large body of pyrrhotite ore that is very promising in appearance.

Somewhat extensive development is being prosecuted on a group of claims on Table mountain, a little to the north-west of Taku portage and on the east of Taku arm, by an American company, under the management of Mr. John O. Cooper, which has built substantial camp buildings, trails, etc.

Some promising properties are also being developed in the vicinity of Lake Bennett and Otter lake, on the former of which, particularly, large deposits of good ore are represented as existing, from which shipment may be undertaken at almost any time.

Some new discoveries in ledge form have also been reported, notably upon Boulder and Spruce, but upon these sufficient development work has not been performed to warrant any report.

A new departure in the mining industry has been made in developing the extensive deposits of magnesite adjoining Atlin townsite on the east. All the available deposit has been acquired by a local syndicate, and a shipment of something like 175 tons of the magnesite was shipped this fall to a firm in San Francisco, for test purposes, the results of which, I believe, have not as yet been ascertained.

Office Statistics—Atlin Mining Division.

Records issued, 107, representing	107	claims.
Re-records issued, 469, representing	502	〃
Bills of sale recorded (placer)	303	
Grouping permits issued	32	
Abandonments filed	11	
Leave of absence granted, representing	357	claims.
Free miners' certificates issued (individual)	831	
〃 〃 (companies)	13	
〃 〃 (special)	3	
〃 〃 (substitute)	1	
Mineral records issued (Atlin, 75; Wells, 29; Bennett, 1)	105	
Certificates of work issued (Atlin, 91; Wells, 17; Bennett, 14)	122	
Notices filed under the "Mineral Act" (Atlin, 8; Wells, 2; Bennett, 1)	11	
Bills of sale recorded under the "Mineral Act"	11	
〃 〃 (hydraulic)	96	
Permits to move stakes issued	14	
Applications for mining leases declared void, etc	29	
〃 〃 declined	16	
Hydraulic leases cancelled	2	
〃 applied for	105	
〃 issued	61	
Water records applied for	16	
〃 issued	4	
〃 abandoned	*nil.*	
〃 cancelled	〃	
〃 in force	64	
Bedrock flume grants applied for	1	
Investigations held by the Gold Commissioner under Part IX of the "Placer Mining Act"	61	

Revenue Collected

Free miners' certificates, individual		$ 4,099 50
〃 〃 companies		1,092 50
Mining receipts, lease rentals		8,245 00
〃 lease deposits		2,200 00
Water records		1,175 75
Bedrock flumes		300 00
Mining receipts, other sources		4,519 70
Leave of absence		917 50
Royalty on mines and minerals	$5,472 64	
Less amounts refunded	392 50	
		5,079 99
		$27,629 94
Revenue collected, other than mining		12,387 11
Total revenue of Atlin office for the year 1904		$40,017 05

GOLD PRODUCED UPON WHICH ROYALTY WAS PAID, 1904.

Creek.	Total Output of Creek, 1904	Individual Miners.			Companies.		
	Value.	Ounces.	Value.	Royalty.	Ounces.	Value.	Royalty.
Pine Creek.....	$107,317 65	3,364	$ 52,130 65	$ 596 35	3,560	$ 55,187 00	$ 983 75
Boulder Creek..	107,905 60	1,478	22,905 60	271 20	5,484	85,000 00	300 00
Spruce Creek...	101,556 95	5,811	92,978 60	985 90	538	8,578 35	111 35
McKee Creek...	57,191 00	186	2,891 00	29 50	3,503	54,300 00	1,010 00
Birch Creek....	16,100 00	258	4,000 00	....	780	12,100 00	202 00
Wright Creek..	3,365 00	234	3,365 00	6 00	....	....	....
	$393,436 20	11,331	$178,270 85	$1,888 95	13,865	$215,165 35	$2,607 10

Royalty paid in 1904 on gold recovered in 1903 .... 976 59

Total.. $3,583 69

In the above is included $68,000 for Boulder creek, on which the royalty has not yet been paid.

SUMMARY.

Ounces.	Ounces.	Value.	Royalty.
Individual miners..	11,331	$178,270 85	$1,888 95
Companies	13,865	215,165 35	2,607 10
Total..............................	25,196	$393,436 20	$4,496 05

To which is added royalty paid in 1904, on gold recovered in 1903.............. 976 59

Making the amount of royalty collected, 1904 .... $5,472 64

NORTHERN PORTION OF CASSIAR DISTRICT.

(Including the Teslin, Liard and Stikine Mining Divisions.)

REPORT OF JAMES PORTER, GOLD COMMISSIONER.

I beg to submit my annual report upon the mining in progress in the Northern Cassiar District, which includes the Teslin, Liard and Stikine Mining Divisions.

I regret to say that, from the standpoint of gold produced, the season has been a poor one, and this is accounted for by the fact that the Berry Creek Mining Co., Ltd., which controls a large extent of the old gold-bearing channels on the south side of Thibert creek, below the mouth of Berry creek, did not wash any gravel this season.

Berry Creek Mining Co.

The Berry Creek Mining Company, Ltd., has been operating on this creek for several seasons, and despite many obstacles, has of late years been the largest producer in the district. This company, under the management of Mr. Alex. Hamfield, while it has proved beyond a doubt that the ancient alluvial deposits of the locality contain gold in quantity sufficient to be profitably worked, has found itself in the position that, to carry out the work to advantage, it must enlarge its available water supply and plant, matters requiring a considerable outlay of money and energy, if the plant is to be re-installed this coming season.

The question of transportation of heavy machinery into the district is a serious one, as you will see from the following:—Machinery is transported by a coasting steamer from some coast city to the mouth of the Stikine river, and from here it is taken by river steamer to Telegraph creek, the head of navigation on the Stikine. From Telegraph creek it has to be packed on the backs of animals, or, if the pieces are too heavy, hauled over a pack-trail for a distance of 75 miles, to the head of Dease lake. It is then transported down the lake on scows for a distance of 25 miles, to be again packed by animals to the mine, a further distance of 7 miles.

NOTE BY PROVINCIAL MINERALOGIST.—The following has been extracted from the official report of the manager, Mr. Alex. Hamfield, to his Directors, and is by his permission here given:—

"The Berry Creek Mining Company was formed by Mr. Hamfield and his associates to take over the property of the Thibert Creek Mining Co., of which it is, therefore, the successor. Upon the formation of the company in the early part of 1904, it was realised that, to operate the property successfully, the plant of the Thibert Creek Company, using 500 miner's inches of water a day, must be materially enlarged, and consequently, additional equipment was ordered to bring the plant up to the utilisation of 1,000 miner's inches daily. The additional plant so ordered consisted of:

1,200	feet pipe,	18 in.	diameter, of	No. 12 steel.
500	"	18 in.	"	No. 14 "
300	"	12 in.	"	No. 16 "
800	"	10 in.	"	No. 16 "

Two No. 6 steel construction, double-jointed, ball-bearing giants.

Twenty-one 18-in. 3-piece water gates, with accessory fittings.

"Owing to the difficulty in getting prompt delivery, this material did not reach Telegraph Creek, the head of navigation, until June 20th. It was started to the mine by H. B. Co.'s pack-train, but by the end of the season had not all arrived. The remainder, however, will be forwarded by sleighs this winter and so will be on hand for an early opening in the spring.

"The freights from Wrangel to Telegraph Creek were $40 per ton, and from Telegraph Creek to the mine $200 per ton of 2,000 lbs., which gives some idea of the costs entailed by the remoteness of the camp.

"It was decided, considering the lateness of arrival of the equipment, not to attempt any washing during the year 1904, and only a force sufficient to erect the new plant was taken in.

"The non-delivery of the plant as contracted for prevented the complete installation of the new plant, but all the pipe was rivetted together, and about 1,000 feet of the most difficult part was laid, and the remainder can be quickly put in place in the spring.

"The sluices in pits Nos. 1 and 3 were lowered 12 and 20 feet respectively, to give a more effective grade and facilitate removal of boulders. A new pit, No. 4, was opened at the lower end of the workings and 100 feet of sluice-boxes, 3 by 5 feet, laid therein. A lot of other work also was done, such as re-adjusting car tracks, building bridges for pipe-line and a new spillway, rendering the dam tight, etc. The saw-mill was removed from the mine to a site on Dease lake, opposite Porter's landing, where a better supply of timber is to be had.

"Water was brought on from the second fork of French creek into Berry creek, while a new water record of 300 inches was acquired on the second tributary of the north fork of Dease river. The total distance this water will have to be brought is 12 miles, but a survey shows that, by utilising a natural waterway, a ditch of less than two miles will suffice.

"Some definite measures are to be taken towards the saving of the osmiridium which is known to exist in the deposit to an appreciable amount.

"The expenditures for re-equipment this past year were over $20,000, and some additional expense will have to be incurred to bring the new plant up to a state of efficiency, but when this is done the plant will be in a much more efficient condition than ever for economic production, and 1905 should witness a successful run, with a steady flow of 1,000 miner's inches of water, six monitors that may be used, and five openings through which to wash the gravel."

Rosella Company.

The Rosella Hydraulic Mining and Development Company, with head office at Victoria, B. C., and of which J. W. Haskins is manager, controls certain property on Rosella creek. Last winter the company had a waggon road cut from Dease river to its claims on Rosella creek, a distance of 12 miles, to permit of the transportation of hydraulic equipment. A portion of this plant arrived at Telegraph Creek during the summer and some of it was started out on the trail to Dease lake, but was left at a point 23 miles out, from whence it will be taken this winter by dog teams to the head of Dease lake and in the spring conveyed down stream as soon as the ice breaks up. The company will probably be able to install the plant next season in time to have a short run.

A number of parties were searching over the district this past summer in quest of suitable locations for hydraulic and dredging leases, with the result that several have been staked on Dease river and on McDame creek.

It is reported that a Seattle company expects to install a plant this coming season on certain of the McDame creek locations.

Three men have been prospecting in the Clearwater river section of the district, and I am pleased to be able to report that they were rewarded by finding some very good placer ground on what is known as the first north fork of the Clearwater river. I believe that several men will be employed in the locality this coming season.

Quite late in the season several placer claims were located in the north-western portion o the Teslin Mining Division, on Consolation creek, which flows into Gladys lake from the south-west. This locality is remote from Telegraph Creek, the Record Office of the Division, being nearer to the Atlin Record Office; the Mining Recorder at which point, Mr. E. J. Thain, has been appointed a Deputy Mining Recorder for the Teslin Mining Division. These locations were consequently received by Mr. Thain and by him forwarded to the Teslin Record Office at Telegraph Creek, to be there recorded.

Under date of November 24th, Mr. Thain reports as follows:—

"Consolation creek (erroneously marked on the departmental map as Consolidation creek) is a feeder of Gladys, or, as it is sometimes known locally, Sucker lake.

"These locations are reached from Atlin by a trail by way of Fourth of July creek, up Volcanic creek, crossing the divide and following Consolation creek down to the *Discovery* claim. The distance from Atlin is variously estimated at from 40 to 45 miles in a north-easterly direction.

"An alternative and almost level route may be taken by following Pine creek up to Surprise lake; thence following the southern shore to the north-east to the end of the lake; thence over a low divide on to one of the tributaries of Consolation creek, which is followed down to its junction with the main stream.

"Consolation creek rises on the eastern slope of the same range of mountains in which, on the western slope, Birch, Boulder and Ruby creeks, of the Atlin Division, have their source.

"*Discovery* claim, on Consolation creek, was recorded at Atlin only late in the season, on September 22nd, 1904, and, consequently, very little work has been done on it as yet, while subsequent locators have made no attempt to prospect their claims, the season being too far advanced to permit of work being done to any advantage. The discoverers say they intend putting on machinery in the spring, which would indicate that they consider their ground to be fairly deep. It is reported that they are drifting in a bench in an apparent endeavour to strike rimrock."

Prospecting was prosecuted this past season by several parties in the Terrahina district, that is, on the eastern slope of the range which forms the divide between the watersheds of the Atlin and of the Teslin Mining Divisions. In one instance a prospector claims to have found good prospects in a dry gulch, but, although he found in a pan a nugget worth from one to two dollars, water not being available, he made no locations.

Other than those already mentioned, no new finds have been made in the district.

The bringing in of machinery by those already interested in the district demonstrates their faith in its future prosperity, which, I think, is warranted. There are many old channels in the district which will yield a harvest of gold, if taken hold of in a proper manner and handled by practical men.

At present, as must be expected in such a vast interior district, the difficulty and expense of transporting machinery and supplies is a very serious handicap, and no greatly increased activity need be looked for until such handicap is removed by the construction of a railway, or at least of a serviceable waggon road.

Owing to lack of mail facilities in winter, the office statistics are given for the period stated, and not for the calendar year.

OFFICE STATISTICS—NORTHERN CASSIAR DISTRICT.

(From November, 1903, to October, 1904, inclusive.)

From free miners' certificates issued	$ 268 00
From general mining receipts	2,245 50
	$2,513 50

NOTE BY PROVINCIAL MINERALOGIST.—The following is from a Report made by Mr. R. D. Featherstonhaugh for the Atlin-Tuya Coal Prospecting Syndicate, upon certain coal lands situated on the Tuya river:—

"I left Atlin on July 4th, 1904, over the Dominion Telegraph trail to Nahlin, thence over the old Teslin trail to Telegraph Creek, arriving there on July 17th. I learned there that the Tuya river was very high and it would be impossible to cross it if I went up by the Dease trail and Caribou camp on the east side of the river. As the stakes of your property and the principal outcrop of coal are on the west side, I had to go up on that side, following an old Indian trail for some distance, having to cut out a trail for the pack-horses for 12 or 15 miles. This necessitated the employment of two extra men and one horse for seven days, and leaving Telegraph Creek on the 18th, I arrived on the property on the 21st of July.

"The easiest route to reach the property would be from Wrangel by steamer up the Stikine river to Telegraph Creek, thence by saddle horse, which would occupy about three days from Wrangel.

“The property is situated on the Tuya river, in the Cassiar District, Province of British Columbia, about 25 miles up stream from where the Tooya empties into the Stikine river and about 35 miles from the village of Telegraph Creek. At the latter place there are stores, hotels, post office and telegraph office. The property consists of 13 leases, each one mile square, or over 8,000 acres.

“The country for about 15 miles along the Tuya river is of sedimentary formation, consisting of carboniferous conglomerate, sandstone and shales, the general trend being north-east and south-west, the contact on the north being principally granite and on the south basalt and other eruptive rocks. The sandstone and conglomerate apparently extend in a westerly direction, a distance of nearly 50 miles, to the Nahlin river, where the same formation with the same plant fossils can be easily seen.

“Lying between the strata are large seams of coal. Outcrop No. 1, marked on the accompanying plan, is a seam of coal 38 feet thick lying on a bed of clay and shale, capped by a stratum of conglomerate of varying thickness, then a stratum of coarse sandstone, on top of which has been deposited by ice at a later period about 20 feet of coarse gravel composed of granite and syenite boulders. This coal seam strikes approximately N. 30° W. and S. 30° E., and has been tilted to an angle of about 40°, and has been cut through by the river for a depth of 35 feet, thereby saving a large amount of prospecting to get the information which has been obtained at this point. An analysis made by the Provincial Assayer at Victoria, B.C., from samples, last November, gave the following results:—

“Moisture	11.35 %
Volatile matter	28.36 %
Fixed carbon	49.22 %
Ash	9.92 %
Sulphur	1.15 %
Heating value in British thermal units	11,401

“Outcrop No. 2 on plan is a seam of coal 26 feet thick and about one-half mile down stream from outcrop No. 1, dip and strike corresponding with No. 1, but a distinctly separate seam, and can be traced for a long distance on the surface.

“Outcrop No. 3 on plan shows up on Coutts creek about 400 yards up stream, on the right-hand side going up. Coutts creek is a large creek running nearly east and west, emptying into the Tuya river about one and a half miles below No. 1 outcrop. This outcrop is over 40 feet wide, dipping at an angle of 35° to the north, and strikes more with the trend of the country, namely, easterly and westerly. A great deal of coal can be found in the wash in the creek bottom.

“The whole area is fairly well timbered with spruce, affording sufficient supply for mining and construction purposes.

“A practically unlimited water power can be obtained at a reasonable cost from the Tuya river and Coutts creek.

“Of course railway facilities for the handling of the coal is an absolute necessity. The proposed line from Kitimat harbour or Hazelton to Dawson would pass through the property within a few miles of the present outcrop of coal, following the old survey of the Cassiar Central Railway.”

SKEENA MINING DIVISION.

REPORT BY JOHN FLEWIN, GOLD COMMISSIONER.

SIR,—I have the honour to submit herewith my annual Report on mining operations in this Division for the past year.

On the whole, there has not been as much activity as I had expected, yet the receipts show a gratifying increase, the mining revenue being over fifty per cent. in excess of the previous year. Although there has not been any extensive development in any particular section, a large amount of preliminary work has been performed by individual prospectors and small companies, the results, in most cases, being very satisfactory. Portland canal and the Telkwa river camps continue to attract the most attention, the former especially showing greater promise of becoming an exceedingly rich camp than was hitherto expected of it. Two new discoveries were located here during the season, one of them a body of high-grade silver ore across the divide from the *Stewart* property, the other being a large body of copper-gold ore near Maple bay, located under the name of the *Copper King Group.* A large amount of stripping and cross-cutting was done on this property, and there is every evidence that it is a true ledge with well-defined walls.

Following in William Hunter's tracks, a number of prospectors went into the Telkwa camp, and succeeded in locating some rich ore, assays from which range from $90 to $116 in gold. All who have located in the camp are most enthusiastic about their prospects. The ore is not only high-grade, but the bodies appear to be immense. Copper, gold, silver ores, and hematite iron are there in abundance, while there are immense fields of coal within a few miles. Indications point to a considerable influx of prospectors, both into Telkwa and Portland-Observatory inlet camps, which will undoubtedly both be very busy centres during the coming year.

PORTLAND CANAL.

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Negotiations have been on foot recently for the acquisition of several groups in this camp both by Seattle and Alaska companies, but so far only one deal has been consummated, that of the *American Girl Group*, on American creek, the property of Stewart, Conway and Brightwell. The deal is a 12 months' bond for $100,000, with payments at stated intervals, the purchasers to carry on continuous work. This is the largest price ever offered for a mineral property in either northern British Columbia or Alaska. The purchasers have made a thorough inspection and are confident that they can ship from the start ore which will average $100 per ton. These parties shipped the whole of their supplies, powder, horses and men by the steamer "Nell" in October, but, unfortunately, the loss of that vessel by fire, compelled them to return south for the winter. They now intend to bring in fresh supplies in February, and get the property on a shipping basis early in the spring.

Across the divide from the *Stewart* property, Messrs. Harris & Rearick, of Ketchikan, located, in August last, a fine-looking body of silver ore on Salmon river. This stream flows into Portland canal, about two miles south of Bear river, and was formerly embraced in the territory of Alaska, being to the west of the Provisional Boundary, but since the establishment of the permanent boundary monument at Eagle point by Commissioners King and Tittman, last August, the line deflects to the south sufficiently to include on the Canadian side the headwaters of Salmon river. This includes the whole mineral belt where the new discovery lies. The discoverers located six claims, composing the *Silver Lake Group.* Their main showing is exposed 500 feet in length, and from 10 to 20 feet in width. The hanging wall is grey porphyry, with a blue lime foot-wall. The average of their assays gives $48 in gold, silver and copper from the surface, one assay showing $34 in gold alone. It is the intention of the locators to take in supplies over the ice and commence active development early in the spring.

On the summit between the *Silver Lake* and *American Girl Groups*, Dan. Lindeborg, an old Boundary prospector, late in the fall located four claims, the ore on which is similar to that on the two former groups. The distance from the *Silver Lake* to the *American Girl* is about five miles through an open country, easily prospected, and with abundance of bear, mountain goat and marmot, and the lakes, of which there are many, teeming with trout.

Considerable work has been done on the M. K. Rodgers properties (of which J. E. Stark, of Nanaimo, is superintendent), as follows:—

On the *Silver Bow Group*, consisting of the *Silver Bow Nos. 1, 2, 3* and *4*, and *Washington* mineral claims, one tunnel in rock 15 feet long, 5 feet wide and 7 feet high; one cutting in rock 40 feet long, 5 feet wide and 5 feet deep; one cutting in earth 80 feet long, 5 feet deep and 5 feet wide.

On the *Homestake Group*, consisting of *Homestake Nos. 1, 2, 3* and *4*, one open cut in rock, 8 feet wide, 5 feet deep, and 10 feet long; one open cut in rock 6 feet wide, 10 feet deep and 15 feet long; one cross-cut on ledge in rock and earth 5 feet deep, 5 feet wide and 20 feet long; one trench on ledge in earth 8 feet deep, 5 feet wide and 10 feet long.

On the *Golden Sheaf* and *Iron Crown Groups* considerable surface prospecting and stripping has been done. In addition to this work the Rodgers company has built cabins, blacksmith shop, etc., on each group and graded twelve miles of trail.

On the *Roosevelt Group*, situated on Bitter creek, a tributary of Bear river, Messrs. G. Chambers, J. E. Stark and D. J. Rainey, have run their tunnel in 230 feet, in addition to stripping the ledge in a number of places.

On the *Ruby* and *Morning* mineral claims, owned by Rev. W. H. Collison and W. Noble, the following work was done: 50 feet of stripping; one open cut in rock and gravel 10 feet long, 4 feet deep and 4 feet wide; one open cut in rock and gravel 9 feet long, 7 feet deep and 4½ feet wide; one open cut in rock and gravel 6 feet long, 4 feet deep, and 4 feet wide.

The *Hector Group* consists of the *Hector*, *Tiger*, *Wild Goose*, *Detroit*, *Rainier* and *Black Hawk* mineral claims, owned by Messrs. Chambers, Deaville & Co. On these claims the following work has been done: One open cut, 16 feet wide, 20 feet long and 8 feet deep, in soil; one open cut in rock, 8 feet long, 6 feet wide, and 6 feet deep; stripped ledge a distance of 75 feet, in soil and rock, 10 feet wide and 6 feet deep; two small open cuts, one in rock and one in earth.

On the *May Bee* and *Blue Jay*, two promising looking claims, only statutory assessment work was performed.

The Portland Consolidated Company have performed the following work on the *Blue Bell Group*, situated at Maple bay: Run 17 feet of tunnel, 5 feet wide and 7 feet high; one open cut in rock and gravel, 14 feet long, 7 feet deep and 4 feet wide; one open cut in loose rock, 17 feet long, 6 feet deep and 6 feet wide; one open cut in rock, 16 feet long, 6 feet deep and 4 feet wide; stripped and cross-cut 110 feet of ledge.

The *Copper King Group*, also situated near Maple bay, consists of the *Copper King*, *Hope*, *Elsie* and *Summit* mineral claims, owned by Messrs. Noble, Woodcroft, Collison and W. R. Flewin. On these claims the owners have traced the ledge 2,300 feet, stripping, cross-cutting and sampling every 100 feet. The ledge is very uniform and well defined throughout the whole distance, varying from 5 to 20 feet in width. This is a splendid concentrating proposition with every facility for inexpensive handling, being only about three-quarters of a mile from the beach, with an altitude at the highest showing of 1,280 feet. The gangue is quartz, with porphyry and diorite walls. The values are in gold and copper. In addition to other work the owners have built a good trail from Maple bay, and erected a house, etc.

OBSERVATORY INLET.

In this camp statutory assessment work has been recorded on the *Bonanza* and *Hidden Creek Groups* of claims. Negotiations are about closed for a sale of these properties to an American company for $60,000.

Reference was made last year to a discovery of ore on Alice arm by Messrs. Roundy and Nicholson, just before my report was sent in. Two claims were located, the *Black Bear* and *Aldebaran.* The find proved to be much more valuable than was at first supposed. The ore is ruby silver and gray copper. The owners have done considerable stripping this season, and have uncovered a ledge 12 feet wide, which contains several stringers from 6 to 12 inches in width of high grade ore. The location is in the same mineral belt as the *Bonanza*, and about half a mile from salt water. A great deal more work would have been done on the property, but owing to the threatening manner of some of the Kincolith Indians, who ordered the owners off the inlet, it was deemed advisable to suspend operations and return to Nass harbour.

QUEEN CHARLOTTE ISLANDS.

Mining in this section has been very quiet during the season, only a few records being issued.

On the *Golden Gate* claim the owner, Abraham Heino, has sunk a shaft 20 feet, while on the *Trust* and *Skincuttle Entrance* claims he has driven a tunnel 60 feet, built a wharf and 300 feet of tramway, with ore bunkers of 200 tons capacity, the whole involving an outlay of over $3,000. A trial shipment of 22 tons of ore was made to the Tacoma smelter, which gave a net return of $9 per ton. The property being so much out of the usual steamboat route, and transportation consequently expensive, further work was suspended. It is expected by the owner, who is still prospecting the property, that it will shortly resume shipping.

KITSILAS CANYON.

Only statutory assessment work has been performed in this camp, with the single exception of the *Golden Crown Group*, owned by Messrs. Jongdall, Anderson, Wells & Durham. Sufficient development had been done on the group to justify the owners in opening negotiations with Vancouver parties to place a stamp mill and other machinery upon the ground. Just when everything seemed ripe for closing the deal, an unfortunate accident occurred on Skeena river, whereby J. E. Jongdall, the senior partner, lost his life by the upsetting of his canoe, Messrs. Durham and Boss, who were his companions, narrowly escaping a similar fate. This has postponed the consummation of a deal until some disposition is made of the interest of the deceased. It is hoped to get the machinery on the ground during the coming summer.

LORNE CREEK.

The Dry Hill Hydraulic Mining Company has prosecuted work steadily all season, employing a large gang of men. Mr. F. G. Holt completed the building of a flume for the company under contract, about the end of the season. Water was turned on for 48 hours, with the very gratifying result that $500 worth of gold dust was cleaned up.

The Hardscrabble Company has been engaged all season in prospecting its ground and making preparations to get water on.

The same thing is true of the *Ibex* hydraulic claim, owned by John P. Fults, Jr., of Fairhaven.

TELKWA RIVER.

In consequence of the discoveries made by William Hunter late the previous year, a number of prospectors went into this camp early in the season. They found the prospects even better than Hunter had represented them, and a number of claims were staked.

On the Hunter claims, consisting of the *Hunter*, *Tin Billy*, *King*, *Prince*, *Idaho* and *Rainbow* mineral claims, the following work was done: One open cut 40 feet long, 3 feet deep and 4 feet wide along the ledge; one tunnel 8 feet long, 6 feet wide and 7 feet high; one shaft 8 feet deep and 4 feet square; one open cut 20 feet long, 6 feet wide and 6 feet deep; one open cut 15 feet long, 4 feet deep and 6 feet wide; one open cut 10 feet long, 3 feet deep and 3 feet wide; one open cut 25 feet long and 4 feet deep; one 5 by 7 tunnel 25 feet long; one open cut 20 feet long, 3 feet wide and 4 feet deep; one open cut 30 feet long, showing the ledge; one tunnel 25 feet long; one shaft 10 feet deep and 4 feet square; and one open cut 15 feet long, 3 feet wide and 3 feet deep.

On the *Telkwa Group*, consisting of the *Telkwa*, *Naiad*, *Oread*, *Daisy* and *Discovery* mineral claims, the property of Messrs. Loring, Hankin & Forrest, the following work has been done: One tunnel 10 feet long; one open cut 20 feet long; one open cut 20 feet long, and two other tunnels each 10 feet long.

On the *Eldorado* claim, same owners, one tunnel has been driven on the ledge 20 feet.

KITIMAT ARM.

No new developments have occurred in this camp during the past season, but steady development work has been carried on upon most of the properties previously located.

On the *Golden Crown Group*, the owners, Messrs. Steele & Dunn, have extended their main tunnel 40 feet, in addition to doing a large amount of surface prospecting and stripping. Every additional foot of work done shows an improvement in values.

On the *Alabama Group*, consisting of the *Kentucky*, *Virginia*, *Arizona* and *Alabama* mineral claims, owned by Messrs. Pettigrew and Mooney, one tunnel has been driven 25 feet long, 5 feet wide and 7 feet high. Also a large amount of shipping, cross-cutting and trail-building.

At Iron mountain, Lindeborg Bros. have driven one 4½ by 6 foot tunnel, 18 feet in solid rock; one 4½ by 6½ foot tunnel, 7 feet; one 3½ by 6½ foot tunnel, 12 feet; and one open cut 8 feet long, 4 feet deep and 4 feet wide, on the *Bimetallic*, *Bullion* and *Independence* mineral claims.

On the *Mountain Goat*, *Lucy* and *Sarah Jane* mineral claims, situated on Gardiner inlet, the owners, Messrs. Conlee and Hilton, have run a second tunnel 22 feet long, 5 feet wide and 7 feet high.

GRIBBELL ISLAND.

The Gribbell Island Copper Company have been steadily working on their *Blue Bell Group*, and have run a second tunnel on the ledge 300 feet.

The Canadian American Mining Company, of Bellingham, Wash., have done the following work on the *Francis* mineral claim for the *Empress Group*:—Drove one main tunnel 190 feet; east drift on vein 10 feet; west drift on vein 26 feet; upraise 18 feet; and west drift 30 feet. They have also constructed one mile of solid puncheon road from mine to beach; the whole involving an expenditure of over $3,000.

PRINCESS ROYAL ISLAND.

The *Princess Royal Group* continues to make shipments to the smelter, the returns from which maintain their values as well as their first shipments. Twenty men are constantly employed, and the C. P. R. steamers now call for ore.

On the *Homestake Group* the usual assessment work has been recorded, the work consisting of open cuts and site for shaft.

Geo. A. Kelly has driven 30 feet of tunnel on the *Bay View Group*.

On the *War Eagle Group* a shaft has been sunk 35 feet on the *War Eagle* claim. The ledge was here encountered, showing high values in gold and copper, and preparations are being made to make regular shipments.

On the *Independence Fraction*, which lies between the *Homestake* and *Princess Royal Groups* of claims, Capt Nowell has stripped the ledge and run one open rock cut 10 feet, also driven on the ledge 16 feet.

The assessment on the *Norah*, *Rose* and *Thistle* was paid in cash in lieu of work.

On Pitt island three magnetic iron claims have been located. The assays shew 54 % iron. No work has yet been done on them.

COAL.

Considerable prospecting has been done for coal on the Telkwa and Kispiox rivers. On the former river it has been established beyond doubt that valuable coal exists in very large bodies. On the property of the Skeena Development Company there are three seams of excellent coal, the largest of which has a width of twenty-one feet on the surface.

On Moresby Island twenty-one coal prospecting licences were granted to Mr. McRae, of Ottawa, and his associates. It is their intention thoroughly to prospect their ground this season. From the surface indications, and also from Dr. Dawson's investigations, it is believed coal of superior quality exists in quantity on these claims. The fossils found on the beach are said to be the oldest coal fossils found on the Pacific Coast.

OFFICE STATISTICS.—SKEENA MINING DIVISION.

Free miners' certificates	191
Mining claims recorded	125
Certificates of work	159
Conveyances	29
Certificates of improvements	5

Revenue Collected.

Free miners' certificates	$ 866 75
Other mining sources	1,255 65
Total	$2,122 40

SOUTH-EAST KOOTENAY DISTRICT.

FORT STEELE MINING DIVISION.

NOTES BY W. F. ROBERTSON, PROVINCIAL MINERALOGIST.

On September 7th the Provincial Mineralogist left Nelson to make a brief visit to the lead-producing mines of South-East Kootenay.

These properties, the *St. Eugene*, at Moyie, and the *North Star* and *Sullivan*, at Kimberley, have been doing little, or no work, for the past few years, as the market for lead ores has been so very poor as to leave little or no margin of profit for ores such as they produce, running high in lead and very low in silver; but, with the aid and under the stimulus of the lead bounty, active work has again begun.

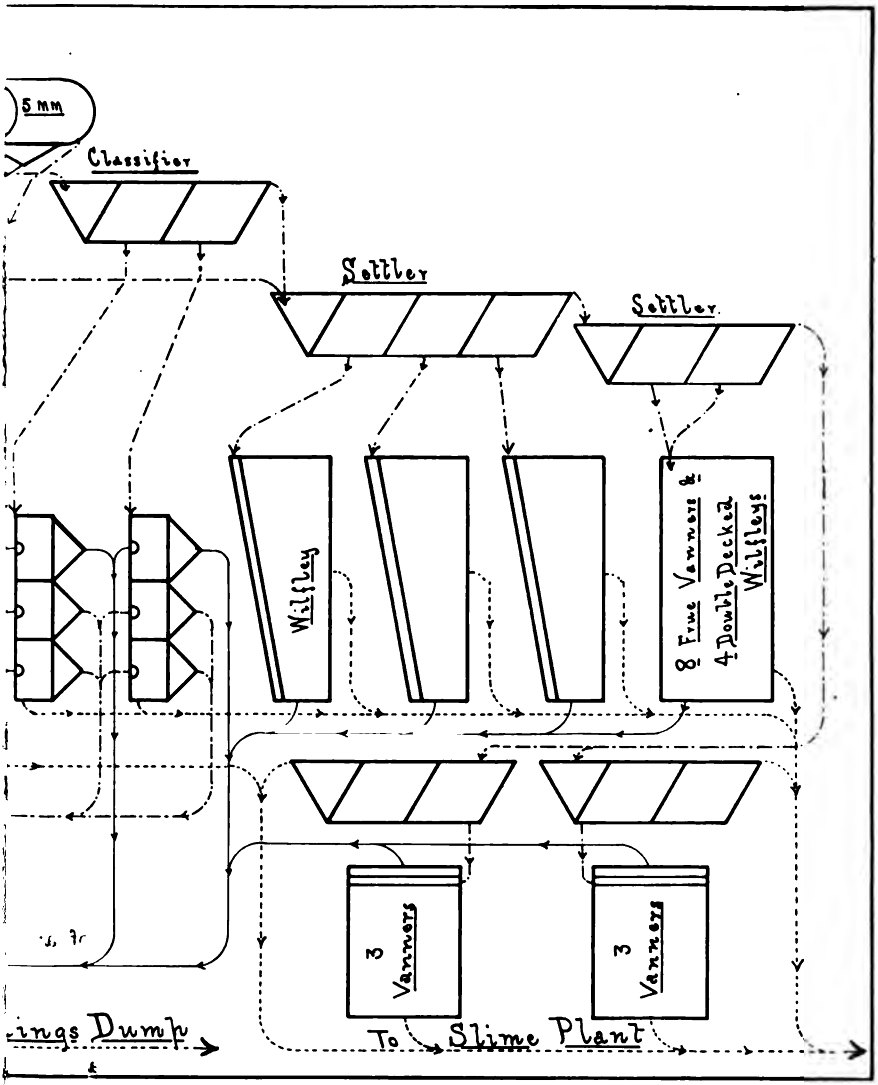
To these mines the lead bounty given by the Dominion Government was of more benefit than to almost any others in the Province, inasmuch as they were capable of producing a large tonnage of ore in which the silver values were so low, as compared with the lead, that the ore might properly be called a "lead-silver" ore, in contradistinction to those of the Slocan, which are "silver-lead" ores. To show what a material help this bounty has been, it might be well to make a roughly approximate calculation by way of illustration.

At the St. Eugene mine it takes about five tons of ore to make one ton of concentrates. A ton of concentrates contains about 33 ounces of silver and 1,300 lbs. of lead; the gross value of this (taking silver at 50 cents per ounce and lead at 1½ cents per pound as approximate figures), would be, silver $16.50 plus lead $19.50; total *gross* value, $36.00. Now, the bounty on a ton of such concentrates, if smelted in Canada, would be $9.75, or about $2 per ton on the ore as mined, the gross value of which, without the bounty, was about $7.20.

The same is nearly correct for the other properties. The result has been that there has been mined in South-East Kootenay in 1904 about 80,000 tons of ore, as compared with 900 tons in 1903, while the present indications are that a further increase will be made in 1905.

St. Eugene Mines.

The St. Eugene mines, owned by the St. Eugene Consolidated Mining Co., Ltd., James Cronin, manager, Moyie, B.C., is a consolidation of all the claims on the western slope of the hill at Moyie on the well known *St. Eugene* lead, which cuts the hill from its summit to the shores of Moyie lake, and which has already been fully described in these Reports. The workings extend along the outcrop for about 4,300 feet, the upper workings being about 1,800 higher than the lake. There are in this distance three distinct "pay chutes," which have been exploited by workings, and between these, while the vein is quite continuous, are barren places. Until very recently, the system of mining has been entirely by adit tunnels on the vein, with stopes therefrom. On the highest group of workings, the *St. Eugene*, there are 5 tunnels, about 100 feet apart vertically, which, starting from the top, have lengths respectively of, "A," 300 feet; No. 1, 600 feet; No. 2, 600 feet; No. 3, 900 feet; and No. 4, 600 feet. On the intermediate workings there are 4 tunnels, having the following lengths: No. 1, 1,500 feet; No. 2, 500 feet; No. 3, 900 feet; and No. 4, 750 feet.



been expected. What were supposed to be small quantities of ore had [illegible] lead-

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The lower tunnel workings on the *Lake Shore* claim are about 100 feet vertical above the lake, where the No. 1 adit tunnel has been driven in 1,700 feet, and above this, at intervals of 100 feet, are levels Nos. 2, 3 and 4.

On these *Lake Shore* workings there is a second vein more or less parallel with the main vein, and known as the South vein, on which the main tunnels have been duplicated, with numerous cross-cuts joining the two.

Near the mouth of No. 1 tunnel *Lake Shore*, and at about the same level, a shaft has been sunk for 125 feet, that is, about 25 feet below the level of the lake. From the bottom of the shaft a level has been run towards the lake, westward, for about 100 feet and to the east for 720 feet, in which latter considerable bodies of good ore were met with. This shaft is most completely equipped, with a hoisting plant sufficient to serve for a considerable further depth. The shaft contains two cages and a pump compartment. The shaft-house is substantially built of heavy timber, and most conveniently arranged for economical handling of the products of the mine.

The ore from the upper workings is delivered to the mill by a Riblet aerial tramway. That from the lower workings and shaft is hauled for about ¼ of a mile on a surface tramway, a mule hauling all the ore produced on each shift.

The ore is galena in a quartz matrix, and as mined, carries about 6 to 8 oz. silver and 13 to 14 per cent. lead, requiring to be concentrated, which is done in the company's mill, where a concentrate is produced running about 33 oz. silver and 66 per cent. lead.

The output of the mines is from 400 to 500 tons of ore per day. In September last about 75 men were employed at the upper workings, about 90 at the lower workings, and some 45 at the concentrator.

Concentrator. The concentrator has been built and brought up to its present condition by Mr. G. A. King, the mill superintendent, and it is not only about the largest concentrator in British Columbia, but is about the best equipped and probably makes a closer saving than any other in the Province. In addition to the usual and the many unusual appliances for saving all values, a complete and supplemental plant has been erected to save the values carried over in the slimes, and to this slime plant are sent the tailings from every machine treating ore of a mesh of 3 m.m. and finer.

A "flow-sheet," drawn by the Provincial Mineralogist, accompanies this Report, which shows the details and exact operations of the mine better than any worded description.

North Star Mine. It has been an open secret for the past couple of years that the known ore bodies of this well-known mine have been nearing exhaustion, and that most persistent and extensive explorations have failed to discover any further body of ore. Two different managers, men of great experience and repute, successively abandoned the task; then outside mining experts were called in, and upon their joint reports it was decided to close up operations and abandon further explorations. Consequently, during the early part of this year, the property was handed over to the accountant, Mr. Neil Curran, to wind up matters and to take out the few tons of ore then known to remain in the mine. That Mr. Curran succeeded to an extent greater than was expected by even the most sanguine, is shown by the fact that during the year the mine has managed to ship over 5,000 tons of ore running from 30 to 35 oz. silver and from 35 to 40 per cent. lead.

This was not taken from any new ore-body, for none has been found, but has been obtained from extensions of the old ore-body, which were found to continue further than had been expected. What were supposed to be small quantities of ore had been left at the ends of stopes or behind lagging, and these Mr. Curran starting to remove, found the ore extended further than had been supposed, and when the property was visited in September, there was at least one stope showing 4 or 5 feet of fair grade galena, which at the time seemed to be holding its size as work progressed, and much ore remained in other parts near the outcrop.

While it can not be said that the showings had as yet showed any great amount of "ore in sight," the fact that attempts to get out the last of the ore had always resulted in revealing more ore, gave hopes that the end was not yet, and that the following up of these ore showings might lead to ore-bodies which had escaped even the thorough and systematic explorations which had been made.

Later advices, however, from unofficial sources, do not indicate that any lasting success has been obtained.

Sullivan Group.

The *Sullivan Group* of claims, belonging to the Sullivan Group Mining Co., of Spokane, is situated on Sullivan hill, on Mark creek, and has been described in previous Reports. It is understood that the stock of the company has been acquired by the Federal Mining Company, of Spokane, and that the property is now under the management of General Manager Roberts of the latter company. The mine is still in charge of James Finlay as superintendent, and when visited in September it was found that very little change had taken place since it was last visited, about a year previous. No further underground work had been done except fixing up the station at the bottom of No. 5 shaft, which had previously been sunk.

As was reported last year, there is a very large tonnage of ore partly blocked out, then estimated at 300,000 tons, and what little development has been done since has shown up more ore of the same class. The ore is admittedly low-grade, about 30 per cent. lead and 15 ounces silver, and as was previously pointed out, smelting is the only possible form of concentration for the ore, and this will have to be done at or near the mine, as the values contained will not stand transportation charges.

Surveys had been made for an aerial tramway from the mine to a continuation of the Kimberley branch of the Canadian Pacific Railway, in the valley of Mark creek, and it has since been reported that the construction of the tramway has now been completed.

A railway haul of about five miles, all "down hill," delivers the ore at the company's smelter, at Marysville.

Marysville Smelter.

The smelter, as it was described in last year's Report, no longer exists, for it has been so completely remodelled as really to amount to a completely new construction. The site remains the same and an attempt was made by the smelter superintendent, Mr. F. D. Weeks, to utilise as much of the old plant as possible, which, however, was very little. Two new spurs from the railway, elevated on trestles, have been run into the works. The sampling plant and building have been completely remodelled, as have also the bins. The former calciner shed has been replaced by a building 72 feet wide by 240 feet long with 18-foot posts, covered with corrugated iron. The calciners have been lengthened from a 40-foot to a 60-foot bed, and connected with a common flue, run underground and connecting with an iron stack, 8 feet in diameter and 150 feet high, set on a concrete base 12 feet above ground, with which is also connected, by an opening on the opposite side of the base, the dust chamber flues from the blast furnace. The former blast furnaces and buildings had been completely removed, and were being replaced by a most substantial modern shed of heavy timbers, in which only one of the old furnaces was to be erected at first.

In September the plant was not sufficiently advanced in construction to warrant a description being given of it, but the work done was so substantial in character, and the general plan so practical and simple as to argue much for the possibilities of the plant when completed.

Late advices indicate that the construction is almost complete and that smelting operations should start early in 1905. Several points in the construction were novel to British Columbia, among which may be mentioned the extended use of concrete in place of red-brick work in furnace flues and in the stack base.

The dust collecting flues were also novel in construction and form, consisting of two walls of concrete 24 inches thick and 5 feet high, placed 11 feet 6 inches apart. Springing from these two walls was an arch in the form of a catenary curve with a rise of 8 feet, built of 8 inches of red brick laid in mortar.

The form of this curve is such as not to create any great horizontal thrust on the top of the walls of the flue; so dispensing with the usual binders and buckstays or excessively heavy bearing walls.

The arch is built in sections of 18 feet, with a space of 4 inches between each, to allow for expansion, which space is covered by an extra ring of red brick, laid on top, and overlapping the ends of the sections of the arch.

FORT STEELE MINING DIVISION.

Report of J. F. Armstrong, Gold Commissioner.*

I have the honour to report on the progress of mining in Fort Steele Mining Division during the year 1904.

There are now 167 mineral claims held under Crown grants or certificates of improvements, and during the year 165 new locations and 260 certificates of work have been recorded. For convenience, I have subdivided the Division into the following sections or localities:—

Fernie and Vicinity.—This section includes all territory east of Kootenay river and south of Bull river.

Fort Steele and Vicinity.—In this section is included all terrritory east of the Kootenay river and north of Bull river.

St. Mary's River and Vicinity.—This includes all west of the Kootenay river and north of St. Mary's river, besides all territory draining into the St. Mary's from the south above White Fish creek, inclusive.

Moyie and Vicinity.—This section includes the drainage areas of the Moyie lake, of the Moyie river south of the lake, and of the Yahk river.

Cranbrook and Vicinity.—This section includes the rest of the Mining Division.

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* *See* also Report ot Provincial Mineralogist, page 104.

The following are statistics of mineral claims :—

Sections.	Held under Crown Grant or Certificate of Improv't.	Certificate of Work Issued.	New Locations.
Fernie and Vicinity	3	26	38
Fort Steele "	34	59	26
St. Mary's River "	90	99	53
Moyie "	23	31	23
Cranbrook "	17	45	29
Totals for 1904	167	260	169
" " 1903	142	335	200
" " 1902	117	451	253
" " 1901	104	642	455
" " 1900	71	704	470
" " 1899	37	718	729

I am indebted to the newspapers of the district for the following information :—

FERNIE AND VICINITY.

The *Hematite Group* of iron claims, 12 in number, is situated on the west slope of Fenwick mountain on the S.E. of the *Bull River Group*. The ore is reported to be a hard red hematite. It is said to be the intention of the owners to apply the method of electric smelting in use in Belgium to the development of this property when the Falls Power Company can supply the electricity. By a recent analysis the ore is said to show 61.34 metallic iron, .062 or less of sulphur, with a trace of phosphorus and no interfering substance. Limestone is plentiful in the vicinity.

Sixteen locations have been made on Sand creek during the year and 12 assessments have been recorded.

FORT STEELE AND VICINITY.

The *Estella* is reported to show two distinct fissure veins—one 14 feet and the other 4 feet in width—the former medium grade silver-lead ore, the latter ore of a finer quality and containing some grey copper. This property is well equipped for the work of development, and has abundant water for power and concentration, besides being well supplied with timber for mining purposes.

The *Victor Group*, comprising the *Victor*, *Olive Leaf* and *J. W. Junior*, is said to show about 3 feet of high-grade galena and a blende which carries 63 % zinc.

The *Grace Dore*, *Lone Star* and *Shamrock* are on a ledge, assays from which are said to show nickel.

The *Dougherty Group*, on Brewery creek, had 315 feet of tunnel and some cross-cuts, which the owner has made single-handed. He says the quartz shows free gold and assays $16 to the ton.

The *Tiger-Poorman Group* has nine tunnels on it, some over 100 feet.

The *Star Group* has 800 feet of shafts, drifts and tunnels and was surveyed this summer for the purpose of Crown-granting. Work on an extensive scale is proposed to be done on this property as soon as transportation is afforded.

ST. MARYS RIVER AND VICINITY.

The *Bracebridge Group* on the west fork of the St. Marys comprises the *Gracie*, *Denbigh*, *Bracebridge*, *Bracebridge Frt.*, *Regina* and *Snowdon*, all reported as carrying copper. On the *Bracebridge* the lead is exposed by erosion, and presents a remarkable showing of copper ore. It is said that 33 feet of solid ore has been encountered in the open cuts and that masses of copper ore lie on the dump of the *Regina*.

The *Welcome Group*, which consists of the *Welcome*, *Enterprise*, etc., has a quantity of fine ore on the dump and a crew of men engaged in further development. A sample of 800 lbs. of galena from the *Enterprise* lead has been packed out, to be tested at the Marysville smelter when that plant is in operation.

The *Myrtle*, near Marysville, shows copper pyrites, and is conveniently situated for transport of ore to the smelter.

It is said that the *Mystery*, on Alki creek, shows a 4-foot ledge carrying bornite, and that specimens of native copper are frequently found on this and on the *Magnet*.

On the Dominion Consolidated property there is said to be a 5-foot vein carrying galena, and fine ore has been taken from the *Malachite*.

The Selkirk Mining Company has six claims on White Fish creek, with ledges said to vary from 4 to 60 feet in width, giving values in copper, silver and gold. Nearly 500 feet of tunnel has been run.

On the *Evans Group*, on a branch of this creek, assessments for three years have been done on the *Sunset*, *Pacific*, *Twilight* and *Curfew*, with good showings.

MARK CREEK AND VICINITY.

The *North Star* mine is employing nine men at present, and in the month of December last shipped 700 tons of clean galena ore.

The *Sullivan* has about 300,000 tons of ore in sight. The smelter has been re-constructed and is likely to procure ores for treatment from properties now under development in the St. Marys valley, Perry creek and Wild Horse. Its operation will greatly stimulate the entire district.

MOYIE AND VICINITY.

Work on the holdings of the St. Eugene Consolidated Mining Company—the *St. Eugene*, *Moyie* and *Lake Shore*—has been prosecuted with vigour since May last. The manager reports that from May to November these mines produced 66,153 tons of concentrating lead-silver ore. There are 43,000 tons in sight, and the average output is 2,700 tons per month. About 250 men are employed. A pump has been installed at the concentrator capable of raising 2,500 gallons of water per minute from the lake. This will enable the concentrator to work should the gravity water system again fail, as it did last summer during the unprecedented drought.

CRANBROOK AND VICINITY.

Twenty-nine new locations have been made in this section during the year, chiefly on Perry creek, Palmer Bar creek, and in Isidore Canyon. Mount Baker still attracts some attention from its iron deposits, four new locations having been recorded.

PLACER MINING.

On Wild Horse, placer mining is still carried on by Chinamen, who have leased the washings from the Crown grantees. During the past season five companies have been hydraulicing on the creek in gravel varying in thickness from 20 to 40 feet, which has proved fairly rich in gold.

On Perry creek, this season, the largest and most important development has been the completion of the plant of the Perry Creek Hydraulic Mining Company, which was fully described in the Provincial Mineralogist's report of last year. The remarkable drought and low water of the past season retarded operations considerably, but the monitors were at work in September.

Six men working on the *Thompson* lease last summer, drifting on bedrock, are stated to have averaged $18 to $20 a day to the man.

The plant on the *Theis* leases during the season was moved from the south to the north side of the creek, where the indications were more favorable and less pumping was required to keep the workings free of water.

There have been eight applications for leases farther up this creek and two on Valley creek, a tributary of Perry.

The Bull River Mining & Power Company, which controls a number of leases on Bull river, has pushed construction work on its dam during the past summer, work being facilitated by the unusually low water. Bulkheads, between seven and eight feet in height, have been completed on each side of the river and concreted to bedrock. A temporary dam has been placed, and the river diverted into about 80 feet of the flume. The management states that the sawmill to cut the lumber for the flume will be on the ground in January and the heavy machinery for the power plant will begin to arrive early in the spring. It is expected to generate 10,000 horse-power.

COAL MINING.

The following summary is given of the operations of the Crow's Nest Pass Coal Company for the year 1904:—

At Coal creek, No. 9 mine was opened during the year, and is now yielding about 5,000 tons per month.

No. 5 mine, at Coal Creek, was developed during the year and is producing 6,000 tons per month.

At Michel a new picking table and screening plant has been installed, increasing the shipping facilities by 50 %.

A most efficient system of fire protection has been installed at Michel, and at all the collieries hose and hydrants sufficient for protection have been furnished.

The extension of the Crow's Nest Southern Railway from Morrissey to Fernie has added to the shipping facilities and will open new markets.

The Imperial Coal Company is the holder of 94 coal claims on Fording river. The claims have been surveyed, trails have been built throughout its lands, and extensive development work has been prosecuted until the close of the season. Valuable beds of coal have been uncovered.

The Elk River Coal and Oil Company holds 30 claims on Elk river, 10 to 20 miles north of Lot 4,588. Several of these claims have been surveyed, and sufficient development work has been performed to warrant the renewal of their licences.

A syndicate holds 45 coal claims between those of the Elk River Company and Lot 4,588, and sufficient work has been done on these to warrant the renewal of their licences.

In the Flathead region, Lot 4,593, there have been issued 544 coal licences. Fifteen of these on Sage and Kishenenah creeks have been surveyed, and I hear that development has been commenced there.

OFFICE STATISTICS—FORT STEELE MINING DIVISION.

Mineral claims recorded	169
Placer claims recorded or re-recorded	4
Partnership placer claims recorded or re-recorded	0
Certificates of work	260
Payments in lieu of assessment work	0
Certificates of improvements recorded	8
Conveyances or other documents of title recorded	59
Partnership agreements	0
Gold Commissioner's permits recorded	16
Documents filed	21
Affidavits filed	363
Records of water grants and permits	2
Mining leases issued	7
Mining leases in force	36
Free miners' certificates, ordinary, issued	396
Free miners' certificates. companies, issued	8
Free miners' certificates, special (individual)	2

Revenue.

Free miners' certificates	$2,610 75
Mining receipts	4.175 15
Total	$6,785 90

NORTH-EAST KOOTENAY DISTRICT.

GOLDEN MINING DIVISION.

REPORT OF J. E. GRIFFITH, GOLD COMMISSIONER.

On the *Good Luck Group* development work continues to be very encouraging, the pay streak of copper ore varying from 12 to 24 inches. The different tunnels and shafts aggregate 1,703 feet. Five men are employed during the winter.

A 700-foot tunnel was driven on the *Alpha Group* during the season, but so far apparently with indifferent results.

The *I. X. L. Group* has been purchased by a company. Development work so far consists of a 150-foot tunnel, showing about 10 inches of clean ore.

The *Falls* mica claims are situated on the north fork of Six-Mile creek. The mica appears to be a very good grade and the surface showing is said to be very encouraging. A trail has been built from the C. P. Railway and work on the claims will be pushed in the spring.

Apart from the above groups, there has been no work done during the season, other than the usual assessment work, and there is nothing of much interest to report, this being one of the quietest seasons yet experienced.

OFFICE STATISTICS—GOLDEN MINING DIVISION.

Free miners' certificates	116
Free miners' certificates, special	1
Free miners' certificates, company	4
Certificates of work	86
Mineral claims recorded	30
Placer claims	1
Placer leases	3
Transfers recorded	18
Powers of Attorney recorded	7
Gold Commissioner's permits	6
Agreements recorded	2
Documents filed	8
Certificates of improvement	8
Affidavits filed	111

WINDERMERE MINING DIVISION.

Report of E. J. Scovil, Mining Recorder.

I have the honour to submit herewith a brief report of the Windermere Mining Division for 1904.

The outlook is very promising. The construction of the Kootenay Central Railway, which will traverse this Division from north to south, is considered an assured fact, and the advent of improved transportation facilities will undoubtedly mark a new era in the development of our mining, lumbering and agricultural resources.

Several claims have reached the shipping stage, and will be in a position to operate on a larger scale hereafter, and more properties will be working this winter than heretofore. Only a few new locations have been recorded, and little more than the usual assessment work has been done, but on the different properties where development work has been carried on continuously, the results have been most encouraging.

Paradise Group. This property is situated on Spring creek, a tributary of Toby creek. In the course of development work 6,044 tons of ore were taken out, 2,044 tons of which have been shipped to the Trail smelter (inclusive of 60 tons now at the Wilmer landing), giving average smelter returns of 57.94 ounces in silver and 58.9 per cent. lead. Development work done during 1904: No. 4 level, 612 feet; No. 3 level, drifts and cuts, 417 feet; shaft below No. 3, 40 feet; cut below No. 3, 55 feet; total, 1,124 feet. Total amount of development work done, 4,733 feet. It is the intention of the owners to install in the spring an aerial tramway from No. 4 tunnel to Pinehurst, a distance of 3½ miles, and to erect also reduction works at Pinehurst.

The *Delphine Group* situated on the north fork of Toby creek, is being worked under a lease. Twenty-nine tons shipped to Trail smelter averaged 125 ounces in silver and 30.5 per cent lead. Ore is being taken out for shipment right along, and will be hauled down to the Wilmer landing during the winter.

On the *Charlemont Group*, situated on Toby creek, development work will be continued throughout the winter, and the ore shipped in the spring. This property continues to improve with work, the assays giving high silver and lead values, with copper, and $2 to $4 in gold.

The *Mineral King*, situated on Toby creek, has a large body of shipping ore assaying well in silver and lead. Development will be continued throughout the winter.

On the *Black Diamond*, situated on Toby creek, considerable work has been done with gratifying results. The paystreak averages 11 inches of solid ore and assays well in silver, lead and zinc. Development work will be continued throughout the winter. There are about 40 tons of ore on the dump awaiting shipment.

On the *White Star Group*, situated on the Jumbo fork of Toby creek, development work consists of: Tunnel, 105 feet; drift east, 45 feet; drift west, 30 feet; besides numerous open cuts. Formation, schist and limestone. The ore is silver-lead carrying a percentage of gray copper. Development work will be resumed in the spring.

The *Sultana Group* is situated on Michelson creek, a tributary of Toby. The ledge averages about 3 feet in width and can be traced for 2,000 feet. The ore is gray copper carrying silver. Development work will be resumed in the spring.

The *Glacier Lode* is situated on the north fork of Toby creek. The ledge averages about 6 feet in width, and the pay streak averages 8 inches of clean ore, assaying high in silver and lead.

The *Black Dyke* is situated on the headwaters of Boulder creek. The ledge averages 8 feet in width, the paystreak averaging 2 feet of clean ore, assaying well in silver. It is a dry ore.

The *Tecumseh* is situated on Macdonald creek, a tributary of Horse Thief. A trial shipment of 29 tons, shipped to the Trail smelter late this fall, gave a gross value of $2,425.96. This property will be worked throughout the winter, and it is the intention of the owners to make regular shipments henceforth.

The *Big Four Group*, situated on Toby creek, consists of five claims, in a limestone and slate formation. The ledge is from 20 to 100 feet in width, and assays well in copper, with $3 in gold. Development work consists of a 30-foot tunnel and numerous open cuts.

The *Kalo* adjoins the *Big Four Group* and is on the same ledge.

The *Blackfoot* is situated on a tributary of north fork of Toby creek, known as Morpeth creek. This property has a good showing of silver-lead ore, assaying well. The ledge averages 2 feet in width, and the paystreak crops out for 400 feet.

The *Silver Glance* is situated on Michelson creek, a tributary of the north fork of Toby. The ledge averages 6 feet in width, the paystreak averaging 4 inches of clean ore assaying well in silver and lead.

On the *Bunyon Group*, situated at the base of Bunyon mountain, Windermere lake, considerable development has been done, showing a good body of ore, with a paystreak of 3½ feet, said to assay high in copper and silver.

No. 3 Creek Camp.

The principal properties in this vicinity are the *Lead Queen* and *Steele Groups*, on the B. D. S. creek; *MacLean Group* and *Dawn* on MacLean creek; and the *Isaac*, *Galbraith*, and *Cocola Groups* on Isaac creek. A waggon road to this camp would enable several of these properties to ship, especially the *Lead Queen Group*, upon which some hundreds of feet of tunnelling has been done.

As most of the properties in this Division have been referred to in previous reports, it is scarcely necessary to repeat them or to give work in detail.

OFFICE STATISTICS—WINDERMERE MINING DIVISION.

Free miners' certificates	86
Free miners' certificates, special	1
Mineral claims located	46
Certificates of work	111
Conveyances	17
Certificates of improvement	4

NORTH-WEST KOOTENAY DISTRICT.

Report by Fred. Fraser, Gold Commissioner.

I have the honour to submit herewith the mining report for the Revelstoke, Trout Lake, Lardeau and Illecillewaet Mining Divisions of West Kootenay District for the year 1904.

The year just closed has not been noted for any unusual discovery of mineral. On the other hand, I think there was less prospecting done during the year than in the preceding ten years, yet the summer season was the finest one for prospecting within twenty years. But the unusually long dry spell affected us directly, causing forest fires which destroyed aerial trams, thereby causing a temporary suspension of operations at the *Eva* and *Gold Finch* properties.

During the year metalliferous mining in the Revelstoke and Illecillewaet Divisions has been confined almost entirely to assessment work. The Prince Mining Company uncovered an unusually large body of copper ore of very encouraging value. The properties owned by this company are considered among the most promising of the Big Bend district.

Steady development has been going on both at Carnes creek and Keystone mountain with very promising results.

In our placer mines the Revelstoke and McCulloch creek leases were worked, employing from 8 to 10 men. At Camp creek a large amount of gravel was moved, and the same can be said of the *Chicago No. 2*, on Smith creek. In the working of the majority of leases the lack of capital is painfully evident. French creek has remained singularly quiet during the greater part of the year, but since the promotion of the Buffalo Mining Company, which is now employing some 12 men on French creek, is showing considerable activity, with prospects of success. On Lardeau creek, near Trout lake, a number of Spokane investors are working good ground.

The encouragement given to the mining industry by large expenditures during the past few years by the Government for roads and trails is now bearing fruit, and several properties formerly considered inaccessible have, during the past year, made trial shipments, justifying larger expenditures in their further development.

REVELSTOKE DIVISION.

Report of W. E. McLauchlin, Mining Recorder.

I have the honour to submit my annual report of mining operations in the Revelstoke Mining Division for the year 1904.

The past year has been very dull, as far as mining in this Division is concerned, nothing but assessment work being performed except by the Prince Mining Company, which has been steadily pushing development work for the past few years. I embody a report, for which I must thank Mr. J. M. Scott, secretary of the company, covering its operations during the past few years :—

"The Prince Mining and Development Company, Limited Liability, has for the past few years been carrying on systematic development work on its copper properties at Standard

Basin, in the Big Bend district, and during that time has opened up large bodies of copper ore. The last strike of note was made in the fall of 1904, when a cross-cut, run at the end of a drift on the ore, proved the ore body to be 15 feet in width and the ore of most excellent quality. The company is now running a tunnel to tap this ore-body at a much greater depth, and is working steadily 24 hours a day. The copper ore taken from this property is exceptionally fine in quality. It is the intention of the company to treat its ore at the Columbia river, conveying it thither by means of an aerial tramway."

Steady development work has been going on on the mineral claims on Camp and McCulloch creeks.

OFFICE STATISTICS, REVELSTOKE MINING DIVISION.

Bills of sale recorded	11
Powers of attorney recorded	10
Certificates of work issued	82
Mineral claims recorded	45
Placer leases issued	5
Free miners' certificates issued	218
" " (special)	2
Money paid in lieu of assessment work	14

TROUT LAKE MINING DIVISION.

REPORT OF F. C. CAMPBELL, MINING RECORDER.

I have the honour to submit herewith my report of the progress of the mining industry in the Trout Lake Division for the year 1904:—

During the year, notwithstanding the absence of any new discoveries, development has proceeded on a very substantial basis. Owing to litigation, development has been retarded on some of the principal properties of Poplar creek; but I am pleased to report that this litigation has now been amicably settled and we may expect increased activity in this section during the coming season.

Another important matter has been the success of the combination concentrating, chloridizing and amalgamating plant operated by the Ferguson Mines, Ltd. This plant, which is situated at Five-Mile, is connected by aerial tramways with the *Silver Cup* and *Nettie L.* mines, owned and operated by the company, and has been in operation since May last, the output to date being 71 bars of bullion and 365 tons of concentrates. I am indebted to the acting manager, Mr. E. G. Hadow, for the following description of the process:—The fine ore passes through grizzlies and the coarse through two Blake crushers into storage bins below. There are twenty 1,000-lb. stamps in operation, each crushing about four tons of ore a day, through a 16-mesh screen. The pulp is classified into two products, coarse and slimes. The coarse is passed into 4 Dodd buddles where the bulk of the barren sand is removed and the galena separated from the remaining sulphurets, this product from the buddles being shipped as concentrates to the Trail smelter. The remainder, consisting mostly of zinc blende, tetrahedrite, iron pyrites and some sand, is thrown on to a storage floor and left to drain. The slimes are passed into spitzkastens and the surplus water removed. From there they are passed on to two Frue vanners, the headings from which pass on to the storage floor below, and mixed with the tailings from the buddles. After draining, the product is dried in a revolving drier, heated with the waste heat from the roasters. There are two White-Howell roasters, into which the ore is charged with the requisite amount of salt and chloridized. It is then charged into amalgamating pans and the gold and silver amalgamated. The mill is operated by water power carried by a flume three-quarters of a mile long. There are two Pelton wheels and two generators of 150 horse-power each, which can be run separately if necessary.

During the year but little actual mining was done on the *Silver Cup*, owing to the fact that the mine had on hand large dumps of second-class ore which had been accumulated during previous years, these being more than sufficient to supply the Five-Mile mill. There were, however, 198 tons of coarse ore stoped and shipped direct to the smelter.

The same conditions which prevailed on the *Silver Cup* hold also on the *Nettie L.*; consequently, only some necessary development work was proceeded with, a force of 9 men being employed.

On the *Union Jack*, situated near Seven-Mile creek, about 230 feet of development work has been done during the year and the lead cut to a depth of 250 feet. I am informed that American capital has become interested in this property and will develop it on a large scale during the coming summer.

On the *Sharon*, situated on Silver Cup mountain, about 70 feet of cross-cut tunnel has been run, with a view of cutting the lead seen on the surface.

The past year has marked a new era in the history of the *Triune*, situated on Triune mountain and owned and operated by the Metropolitan Gold and Silver Mining Co., Ltd. Hitherto, owing to its high altitude (about 7,500 feet above sea level) and the presence of dangerous snow-slides, this property has only been worked for about three months in the year; but during the past summer snow-sheds have been erected which have overcome this difficulty, and the property has been continuously worked since June last, 14 men being at present employed. Eight hundred feet of tunnelling and drifting has been done and 135 tons of ore, of an average value of $133, shipped during the year. It is the intention of the company to build an aerial tramway from the mine to Ten-Mile during the coming summer.

The *Black Prince*, situated on Gainer creek, has been worked under lease during the summer months by a small force of men, and about 30 tons of ore shipped.

Development work on the *Mohican*, adjoining the last-mentioned property, has been proceeded with almost continuously during the year. A cross-cut tunnel is being driven which, it is expected, will cut the vein at a depth of 500 feet below the surface.

In September a lease was taken on the *Badshot*, also situated on Gainer creek, by Alex. McLean *et al.*, but owing to the lateness of the season suitable buildings for winter work could not be erected. During the two months of operation 32 tons of ore were shipped, giving an average value of 177 oz. of silver and 56 % lead. Three men were employed on this property.

On the *Surprise*, situated on the north fork of Lardeau, considerable work of a prospecting nature has been done during the year. At present four men are employed.

On the *Tonawanda*, also situated on the north fork of Lardeau, a cross-cut tunnel was driven for a distance of 55 feet, cutting the lead, and a drift of 40 feet made, and a winze was sunk 30 feet in the ore chute.

The *Lucky Boy*, situated on Trout creek and owned by James J. McGlone, was not in operation from about 1st May to 1st October, owing to a change in ownership. Since October a force of 16 men has been employed on development work. The main shaft has been sunk to a depth of 210 feet. The first level, fifty feet down, has a drift to the right of 100 feet and to the left of 120 feet. The second level, at a depth of about 100 feet, has a drift to the right of about 140 feet and to the left of 190 feet. There is a winze at the east end of the first level connecting it with the surface, and also with the second level. The third level, about 150 feet down, has a drift to the left of 140 feet and is connected at the end by a winze with the second level. The ore in the main shaft continues for the whole distance down, and is from 2 inches to about 1 foot wide. In the second and third levels the ore runs the entire length of the drifts, and is about the same width as in the main shaft. The ore, which is for the most part a galena carrying grey copper, assays about 200 ounces silver and from 20 to 30 per cent lead. The shipments this year have amounted to about 120 tons for the seven months the property was in operation.

On the *Horseshoe*, adjoining the last-mentioned property, about 90 feet of work was done, and about six tons of ore shipped. This property has lately been leased.

About 50 feet of tunnel was driven, as well as considerable surface work done, on the *Copper Queen*, with very good results. This property is situated near the head of Seven-Mile creek.

On the *No. 3*, situated in this vicinity, a cross-cut tunnel has been driven about 175 feet, with the intention of cutting the lead exposed at the surface.

On the *Winslow*, which possesses an excellent surface showing and carries good gold values, considerable work of a prospecting nature has been done.

The *Silver Plate*, situated on American hill, is covered to a considerable depth with wash thickly impregnated with large boulders of high-grade galena ore. On this property a large amount of surface work has been done, as well as about 600 feet of tunnel driven with a view of locating the ledge. So far this object has not been attained, but the owners are still showing their confidence in the property by continuing work.

On the *Silver Leaf*, situated near the last-mentioned property, considerable work of a prospecting nature has been done, with good results.

The *Handy* is situated about one and one half miles south of Gerrard, and is owned by the Handy Mines, Ltd. On this property a shaft 50 feet deep has been sunk and about 180 feet of tunnel driven, as well as some surface work done.

On the *Klondyke*, situated on Tenderfoot creek, a cross-cut has been driven about 105 feet to cut the lead seen at the surface, and a shaft also has been sunk on the lead to a depth of 20 feet.

On the *North Star*, situated on Rapid creek, the tunnel has been extended along the vein and is now in a distance of 300 feet. The vein is from one to three feet wide and assays well in gold.

The *Morning*, also on Rapid creek, has been acquired by the Spyglass Mining Company, Ltd., which has done considerable work on it during the latter part of the year.

On the *Spyglass*, the property of the above-mentioned company, and situated on Poplar creek, development has proceeded with satisfactory results during the past summer. A test shipment of about three tons was sent to the Trail smelter.

On the *Mother Lode*, development work has been carried on continuously since July last. A shaft has been sunk on the ledge to a depth of 25 feet, and the ledge cross-cut for a distance of 15 feet; a tunnel has also been driven 300 feet on the ledge, with cross-cuts at intervals. This is a silver, lead and zinc proposition.

Considerable work of a prospecting nature has been done on the *Gold Park*, with very good results. This property carries high gold values.

On the *Swede*, owned by the Great Northern Mines, about 223 feet of tunnel was run, as well as 1,500 feet of stripping done. Several veins have been exposed on this property, some of which are rich in free gold, and all carry gold values. Eight tons of this ore shipped to the company's mill at Camborne gave returns of $246.50 in all.

On the *Lucky Jack*, the property of the above-named company, on Poplar creek, very little work has been done owing to litigation; however, a settlement of the adverse claims has now been made out of Court, and I believe it is the intention of the company vigorously to prosecute development. I am informed that a mill will be built on this property, and the *Swede* connected by aerial tramway.

The Spokane Falls Placer Mining Co., Ltd., has leased one-half mile of Lardeau creek at a point about one mile above Trout lake, and has built a dam and about 500 feet of flume, but has not as yet been able to get results. Considerable gold has been taken from this point in the creek by individual miners in previous years.

OFFICE STATISTICS—TROUT LAKE MINING DIVISION.

Free miners' certificates issued to individuals	501
" " companies	3
Special free miners' certificates issued to individuals	6
Mineral claims recorded	311
Placer claims recorded	8
Certificates of work issued	659
Cash paid in lieu of assessment work	5
Certificates of improvements recorded	22
Bills of sale, agreements, etc., recorded	200
Abandonments of mineral claims recorded	1
Gold Commissioner's permissions recorded	4
Water grants recorded	1

LARDEAU MINING DIVISION.

REPORT OF GEO. SUMNER, MINING RECORDER.

I have the honour to submit herewith my report of progress of the Lardeau Mining Division for the year 1904.

During the greater part of the year very little prospecting was carried on and few new locations were made, while a large number of the older locations were allowed to lapse. Forest fires were very prevalent and did considerable damage. The Gold Finch Mining Company had to suspend operations, owing to the burning of the aerial tramway and the mine buildings. The Eva Gold Mines, Limited, also suffered considerable loss from fire, while the Ophir-Lade Company only saved its tram-lines and buildings by the most strenuous exertions, aided by a change of wind at a critical time. Now, however, as the year 1904 draws to a close, a more optimistic feeling is noticed; the companies have rebuilt, and have repaired their tram-lines; various improvements are contemplated; more good ore is in sight than heretofore, and, generally speaking, the companies are in a better position for more economical mining and milling.

Eva Gold Mines, Limited.

The Eva Gold Mines, Limited, is the successor to the Calumet & British Columbia Gold Mines, Limited, a reorganisation having been found necessary during last summer. This company is in a better position financially than its predecessors, and is being managed by capable men. The property is in better shape than before the fire. New mine buildings have been erected, the tramway rebuilt, and a smaller tram built to expedite the handling of the ore. Thirty men are constantly employed getting out ore, and the stamps are expected to be dropping again about the 1st January. A compressor plant is also about to be installed.

I quote herewith a report made 31st August last by Mr. A. H. Gracey, the manager for the Company :—

"For some time previous to May 1st, development had been practically suspended in the mine, and the mill was supplied with ore from a large body of quartz opened up by a cross-cut from No. 5 tunnel. This ore-body was mined for a width varying from 6 and 8 to 20 feet, and all the ore was delivered from the mouth of No. 5 tunnel by a long wooden surface chute to No. 7 level, being there transferred to another chute connecting with the bin at the upper terminal of the wire rope tram. This double handling and passing of the ore down these long wooden chutes not only added to the cost, but caused considerable trouble in the mill, on account of the chips and splinters from the chutes interfering with the discharge through the battery screens. We continued milling under these conditions until July 5th, in order to make test runs on different ore-bodies. The results were satisfactory, as it was demonstrated that the large bodies of low-grade ore could be handled at a profit. During these two months, 1,938 tons were milled, which produced $8,270 in bullion, besides $400 (estimated) in concentrates, at a total cost, including $1,200 development, of $6,800, or $3.50 per ton. Thus ore yielding $4.50 per ton was demonstrated to be profitable under rather unfavourable conditions as regards the mining (which was done by hand work), and with only a ten-stamp mill.

"We decided it would be advisable on July 1st to stop mining and milling until such time as we had completed certain development which would save the extra cost of handling the ore through the chutes previously mentioned. This work was in part to connect No. 7 level with the winze previously sunk from No. 5, thereby making it possible to drop all the ore from above No. 5 and from the surface right down to No. 7, where it can be trammed direct to the upper terminal of the tramway. This raise has been pushed vigorously and is now nearly completed.

"In addition to this, we are continuing No. 1 (the upper tunnel) to connect with the *Eva* shaft, a total distance from the portal of 275 feet. This will give us a vertical depth of over 100 feet at this point. It is also our intention to cross-cut from No. 1 and connect with the *Highland Mary* shaft, in which a large body of ore has been exposed. The mouth of No. 1 tunnel is some 650 feet above and beyond the point where the raise from No. 7 is connected through to the surface, and our idea is to install a light two-bucket wire rope tram to transfer the ore from No. 1 to this connection. This will simplify and cheapen very much the handling of the ore.

"We have also opened up by open cuts and quarry a promising body of ore in No. 1 vein, and have built a surface track 175 feet in length, around to the same point on the surface, connecting with No. 7 raise. When all this work is carried to completion we will be able to handle all ore mined above No. 5 level from both veins, quickly and economically to one main chute in No. 7 raise, and from there by tram to the terminal with large cars.

"About the middle of August forest fires destroyed our mine buildings, including the upper terminal of the wire-rope tramway. For some days it looked as though we would lose the mill, flumes and pipe-line, as well as the balance of the tram; but after a hard fight we managed to get the fires under such control that no further damage is anticipated.

"The loss of our mine buildings, although not serious, was unfortunate, as it interrupted our operations. However, underground work at the mine was resumed within a week after the fire, and new bunk-house, blacksmith shops, ore-bins, etc., are now under construction.

"The most serious loss was in connection with the wire-rope tramway. The upper terminal was completely wiped out and the cables were injured at several points. The loss on the tram is protected by insurance, and arrangements are now being made to reconstruct it. We expect, before winter sets in, again to have everything in good running order, under more favourable conditions than any previously obtaining."

Ophir-Lade. This property is not now being worked. The mill, after stamping for twelve months, was shut down last November, and the men at the mine were paid off. I am informed the owners are again about to open up, and will run the mill with ten more stamps. The property is fairly well equipped with stamp-mill, aerial wire-rope tramway, compressor and power drills.

Gold Finch. Mr. A. Rosenberger was working this property last summer, when the forest fires surrounding the property on all sides drove him and his men out. The mine buildings were burnt, with tools and supplies; some of the towers of the tram went also, causing the cable and buckets to come down and nearly wrecking the mill. Mr. Rosenberger had stoped out a lot of good ore and was soon to have milled it when overtaken by this misfortune. There is a large body of good ore in sight here, and the property could be made to pay if economically worked.

Beatrice. This is a silver-lead property situated at the head of Mohawk creek. Some weeks ago it was computed that there were about 3,000 tons of shipping ore in sight, and also many tons of ore which would pay to mill but not to ship. At one place was a vein about two feet wide, plainly to be seen, and carrying its width to the end of the excavations. This rich seam is now being raw-hided to Camborne over the new trail recently completed by the Provincial Government, and from Camborne will go by sleigh and boat to the smelter at Trail. The trail to the mine is six miles in length and, although steep, is of fairly uniform grade; the difference in altitude is 5,000 feet.

Altogether the *Beatrice* mine impresses one as being a valuable property, and it is unfortunate that the owners have not the capital necessary to equip and develop it systematically, instead of which they must, to keep things going, send their best ore long distances to a smelter. A mill such as has been installed at the *Silver Cup* mine would be very suitable to the *Beatrice* ore.

Mammoth. This property is situated above timber line on Goat mountain. The ore is galena and gray copper, some of it assaying very high in silver. A few hundred tons have been raw-hided from the mine this winter and are now *en route* to the smelter. The ore is hand-picked at the mine, and only the very best shipped, as the transportation difficulties are great and the cost heavy.

Silver Dollar. This property is situate on Mohawk creek and is on the same mineral belt as the *Beatrice*. The ore is of the same character, viz., galena and free-milling gold quartz. A force of men is now at work getting a compressor plant and a saw-mill on the ground, the intention being to do most of the mining with power drills. Some 300 feet of tunnels have already been driven, and ore is exposed in various places. Water power is to be used for driving the plant, and the pipes for that purpose are now being hauled on to the ground. The pipe, 18 inches diameter, is of wooden staves wound with galvanised iron wire and is coated with pitch. A dam was constructed last autumn and a site cleared for the mill buildings.

Office Statistics—Lardeau Mining Division.

Free miners' certificates	157
Mineral claims recorded	77
Certificates of work issued	259
Conveyances, etc., recorded	41
Mineral claims Crown-granted	5

NELSON DISTRICT.

NELSON MINING DIVISION.

REPORT BY W. F. ROBERTSON, PROVINCIAL MINERALOGIST.

The boundaries of the Nelson Mining Division were enlarged about a year ago so as to include all the territory of the Goat River Mining Division, which ceased to exist as a separate Division. The Recording Office of the enlarged Division is at Nelson, the former office of the Goat River Division at Creston being now a sub-Recording Office of the Nelson Division.

In the old Nelson Division the majority of the mines produced quartz carrying gold and silver values, partly "free," and partly in pyrite or galena, requiring treatment by stamp-mill and the collection of the concentrates by some form of table.

There are, however, several exceptions to this rule, notably the *Silver King*, of the Hall Mines, where the ore is essentially bornite, carrying silver values, but little or no gold, and certain smaller properties in the Ymir, where the ore is galena sufficiently clear to be shipped direct. These latter occur in a comparatively small area, which appears to consist of sedimentaries similar to the Slocan, included in an area in which the rocks are all of comparatively recent igneous origin, chiefly granite, but with many dykes and injections of a more basic character.

The district, although one of the oldest settled portions of the Kootenays, does not appear to have received the prospecting it deserves, and what was done was largely confined to the vicinity of Nelson and the line of the Nelson and Fort Sheppard Railway, but of late years, however, prospecting has been carried further afield, and a number of very encouraging locations are reported on the Kootenay lake and Columbia river slopes.

The district is exceedingly mountainous and travel by pack-train is impracticable, except along certain beaten lines, so that prospecting has to be done with packs carried on men's backs, which necessarily limits the distance which can be covered from the base of supplies.

The ores of the district are not "showy," and do not readily strike the eye of the casual prospector. Their values are only determined by assay, which the prospector seldom has made unless the specimen shows visible signs of mineral.

Many of the newer properties contain high-grade ore in small quantities, which renders them peculiarly suited to the lease or tribute system of working, which promises in a few years to form an important factor in the production of the district.

Ymir Mine.

The *Ymir* mine has been for some years the largest mine in the district. It was originally opened up by the London & B. C. Goldfields, Ltd., but was transferred later to a subsidiary company—the Ymir Gold Mines, Ltd.,—although it remained under the management of the parent company until the 1st of January, 1903, when Mr. R. M. Atwater took over the separate management for the Ymir Gold Mines, Ltd., of London, England.

On January 1st, 1904, Mr. Atwater was succeeded by Mr. G. H. Barnhart, who had formerly been superintendent of the property under the London & B. C. Goldfields' régime, but Mr. Barnhart resigned in the fall of 1904, and was succeeded by the present manager, Mr. S. J. Speak.

The property is situated on the north fork of Wild Horse creek, about five miles from the town of Ymir. The mine, together with the stamp-mill and cyanide plant for the treatment of the tailings, has been fully described in the reports of the Bureau, so that further detailed description will not now be necessary.

Briefly, the ore-body is a large quartz vein, striking south 65 degrees west and with a dip of 70 degrees towards the north. The width of the vein varies, but in places it is 40 feet wide. The vein is continuous, and has been cut by the 10th level at about 1,000 feet depth. It is in schist, and about 1,000 feet from a granite contact, In the vein is an ore chute having a horizontal length of about 500 feet, on which the mining has been done, the productive workings having been above the No. 6 level. The following figures as to output are given, as showing the amount of ore produced from these workings :—

In 1900, 42,660 tons of ore, giving a yield per ton of $7.20 in gold and 1.06 ounces in silver ;

In 1902, about 50,000 tons of ore, yielding per ton $6.69 in gold and $1.27 in silver ;

In 1903, some 54,000 tons of ore, from which was recovered 11,160 ounces of gold, 5,060 ounces in silver, and 515 tons lead, having a total value of $300,000 ;

In 1904 the output was not so great, being between 30,000 and 35,000 tons.

An adit cross-cut tunnel started at the level of the top of the mill bins, and about 200 feet therefrom, cut the vein at 2,200 feet in, and from this tunnel a level, No. 10, was driven, drifting to the extent of from 400 to 500 feet having been done. The shaft in the upper workings has been connected through to No. 10 level. The ore mined in the upper levels is lowered by a bucket in the shaft to No. 6 level, and here dumped down the shaft to No. 10, where ore bins are provided, from which the ore is loaded through chutes into cars and run out by a mule, four cars to the trip.

On the No. 10 level the vein was just as strong and regular as at any place above, but, according to the report of Mr. Atwater, who did most of the work there, it does not contain the gold values found on the upper levels in the ore chute, but he was of the opinion that the ore chute proper had not yet been struck at this level, and he hoped to strike it by drifting further to the east, in which direction the chute was trending. Since Mr. Atwater left, drifting has practically been discontinued on this level, as Mr. Barnhart was confining his work underground to the upper levels, and was getting out sufficient ore to keep about forty stamps going.

The mill, which has been previously described, is about the best equipped and largest mill in British Columbia, containing 80 stamps of from 850 to 900 lbs. weight each, and 32 vanners.

When the property was visited by the writer in June, Mr. Barnhart was doing some extensive prospecting on the hill, above the outcroppings of the present vein. He had found some very large masses of quartz, which assayed high in gold, and these masses, from the position in which they were found, could not very well have come from the vein at present known, so it was entirely probable that they were from some parallel vein higher up the hill; and in an endeavour to find this, a couple of large costeening trenches had been run, but which at that time had not revealed the expected ledge, although much additional float quartz was found, which assayed well. The ultimate result of this prospecting work has not been learned. The company employs, on an average, about 50 men underground and about 40 above.

Connected with the property is a cyanide plant, for the treatment of the tailings from the stamp-mill, and fully described in the Report of 1903. Briefly, the tailings from the stamp mill, which have been crushed to 50 mesh, pass through two spitzkastens, in which about 70 %

of the total is collected as "sand," 30 % going away with the wash water as slimes. The plant for treating this "sand" consists of six iron leaching tanks, 32 feet in diameter by 6 feet deep, each capable of holding 200 tons of sand; two solution tanks, 15 feet diameter by 12 feet deep; eight zinc-boxes, made of iron, with ten compartments each; together with all the requisite circulating pumps, etc., required; the whole enclosed in a well built house.

Close to this plant, but in a separate building, there is a well equipped testing laboratory, under the charge of Mr. J. McVicar, assayer.

Wilcox Group.

The *Wilcox Group* is situated on the north side of Wild Horse creek, about two miles above the mouth of the north fork, and about seven miles from Ymir by a waggon road, which, after it leaves the *Ymir* mine road, is rather rough. The group consists of four Crown-granted claims, the *Warwick*, *Wilcox*, *Fourth of July* and *Bywater*, and is held by the Broken Hills Mining and Development Company, Ltd., of which E. A. King, of Chicago, is general manager, and A. H. Tuttle is secretary-treasurer and local manager at the mine.

The property is equipped with a small, cheaply constructed, yet seemingly effective mill, which serves admirably the purpose of showing, by practical test, the possibilities of the property, and at the same time of providing sufficient revenue to carry on the development. The mill equipment consists of an 8 by 14-inch crusher, feeding by two automatic Challenge feeders to two Hendy triple-discharge, two-stamp mills, with 1,000-lb stamps dropping 6 inches, at the rate of about 100 per minute, using cast-steel shoes and crushing to 40 mesh, the tailings passing from the plates on to two 6-foot Frue vanners.

The capacity of the plant was given by the manager as about 13 tons a day, when running on ore heavy in sulphides, or 18 tons when the ore contained much oxidised material.

A run of 20 days, made shortly previous to the visit of the writer, the manager reports as yielding $15.26 in gold to the ton, and about two-thirds of a car of concentrates, the value of which had not then been determined. The average value of the ore is given as about $8 in gold per ton, of which about $5 is recovered from the plates, while the tailings average about $1.20 per ton.

The mill is connected with the mine workings by a back-balance aerial tramway, about 2,350 feet long, using two buckets, of 1,000 lbs. capacity each, running on a 1⅛-inch standing rope, with a ⅝-inch haulage rope. The mine workings are somewhat scattered, as is to be expected in a property where there are several very promising showings, and the primary object is development.

No. 1 Wilcox tunnel, altitude 4,000 feet, was in about 350 feet, with a 45-foot winze, on what appeared to be a small cross-cut vein containing some good ore, but not in any very great quantity.

The "Short Wilcox" tunnel was in about 120 feet, on what appeared to be the same lead, but about 75 feet higher up the easily sloping hillside.

No. 2 Wilcox is estimated as 500 feet higher up than the No. 1, and is on a fairly well-defined quartz vein, which at some distance in, appears to fork. Considerable drifting has been done here, and a little stoping.

On the *Fourth of July* claim there are two tunnels, the lower of which, at an altitude of 4,725 feet, is in about 350 feet, driven on a quartz vein, which towards the face becomes somewhat irregular, and from which some very high assays have been reported. The vein matter has been largely stoped out to the surface and sent to the mill, giving, it is reported, very satisfactory results. From this tunnel a winze had been sunk about 60 feet on quartz. A cross-cut was being driven to the right, for the purpose of cutting at that level a dyke about ten feet wide which showed in the upper tunnel, and was said to carry there values of about $8 to the ton.

The formation is schist, very silicious in parts, faulted and cut by numerous dykes, in which there are a number of quartz veins. The values obtained by actual mill test are very encouraging, although no very large single body of ore has as yet been encountered.

Fog Horn.

The *Fog Horn* is another property situated on Wild Horse creek, about two miles up, and is owned by the Golden Monarch M. and M. Co., of which Conrad Wolfe is the manager. The property was closed down about the 28th of March and was not personally inspected, the following information being given by the foreman who had been in charge of the workings:—

The country rock is granite, and is cut by three quartz veins carrying gold values and sulphides. The first workings were on No. 1 vein, below which the other two veins outcrop. Some 900 feet lower than the No. 1 workings, a cross-cut tunnel had been driven in for 1,100 feet, cutting all three veins. Drifting to the extent of about 200 feet had been done on each of No. 1 and 2 veins, the latter being found to be rather broken. To assist ventilation, a fan is used in the tunnel. The mine stopped work, at least temporarily, on 26th March of this year, although two men were kept on until about middle of June.

On the hill rising up immediately to the east of the town of Ymir—sometimes called Dundee mountain,—there are a number of mineral claims in various stages of development, several of which have considerable promise.

Dundee.

The best known of these is the *Dundee*, owned by the Dundee Gold Mining Company, of which R. A. O. Hobbes, of Rossland, is the secretary. The property has had many vicissitudes, having at one time been extensively worked, and, it is said, with success; but for the past few years it has been completely shut down, in which condition it was found when visited, and as the shaft was filled with water, nothing of the underground workings could be seen. The surface is covered with wash, and the various open cuts on the property, in which the surface exposure of the ledge was traced, had caved in.

A fairly well-defined quartz ledge of considerable size, with a strike N. E. and S. W. and a dip from 50° to 60° to the N. W., apparently cutting through a granite formation, has been followed down by an inclined shaft for 260 feet. This is completely timbered and lagged as far down as could be seen. The shaft is provided with a skip dumping into a bin, from which the ore was run out by tram car. The total workings are reported as amounting to about 400 lineal feet. A steam hoisting plant, with vertical boiler and Northey mine pump, completes the machinery equipment. The buildings consist of an ore shed, office, bunk-houses, etc. A concentrating mill had been built on Bear creek some distance below the shaft, with which it was connected by a surface back-balance tramway, but both of these have been destroyed by fire. The assay values obtained from the surface cut are reported to have been high in gold and silver. The values reported from the working of the shaft are said to have run from $10 to $15 a ton, and in places as high as $20.

Efforts are being made towards opening up the property again, which would probably be done by running a cross-cut tunnel from lower down the hill.

Many of those connected with the mine, when it was running, have still great confidence in the possibilities of its becoming a valuable property, and are prepared to expend considerable further capital on their belief, so it is expected that in 1905 the *Dundee* may again enter into the list of shipping mines.

A fairly good waggon road extends from the town of Ymir up to the mine, but it is at present rather out of repair, owing to mud-slides. A branch from this road leads to the *Atlin* mining claim.

Atlin-Nome.

The *Atlin* and *Nome* claims are situated higher up the hill, somewhat to the north-east from the *Dundee*, and are held by Pat Daly, A. Parr and others—a working partnership. The workings consist of a shaft following the ore down for about 60 feet, at an angle of about 50°, with a cross-cut of about 50 feet to the north, all of which workings carried ore.

Some 238 feet vertical, lower down the hillside, a cross-cut adit tunnel has been run in, and at 215 feet cut the vein developed by the upper workings; it was continued for 100 feet more into the country rock, without meeting anything of importance. From this tunnel, where it intersects the vein, a drift has been run to the south, from which, at a point supposed to be in the line of the production of the upper shaft, a raise was being put up to connect with such shaft. This raise was up from the level some 170 feet on the incline, but at the time visited, the end of June, had not "holed through," which, however, it was expected to do in a short time, as could be determined by the sound of "tapping" from one working to the other, but which also seemed to indicate that the "holing through" would be into the upper drift.

The vein appears to be fairly regular and permanent in its strike and dip, and is probably a replacement vein in a much decomposed dyke, porphyritic in structure, which seems to follow close to a granite mass. The ore is quartz, heavily mineralised with iron sulphides; in places there are lenses of solid sulphide, but the bulk of the ore is as described. The values in the ore, as sorted, are from $20 to $25 a ton, which figures are borne out by such shipments as were made during last year.

Yukon.

The *Yukon* is above the *Dundee* and adjoins on the south the Atlin group, being held by certain of the same owners. It was Crown-granted in 1904. There appears to be a strongly defined vein running in a north-east direction, and having a dip of 80° to the south-west, cutting through a dark-coloured, fine-grained rock of igneous origin. The width is approximately from 4 to 8 feet, the "pay" being in a streak of from 1 foot to 2½ feet wide. The ore is quartz, carrying iron, zinc and lead sulphides, which contain values in gold and silver, reported to run from $10 to $20 a ton as shipped.

A tunnel has been driven in on the property a distance of 245 feet, but owing to the easy slope of the hill a depth at the face of only about 50 feet was gained. In the tunnel, for the first 150 feet from the portal, no ore is apparent, but at that point the ore comes in from the foot-wall, and is more or less continuous in the tunnel to the face.

Yankee Girl.

To the south of the *Yukon*, and higher up the hill, is the *Yankee Girl* mineral claim, owned by David Grobe and Jas. Graham. On this claim there is a tunnel about 200 feet long, following an acid dyke which cuts through a dark, close-grained rock, apparently an altered slate. In an open cut 20 feet higher up, there is visible a 2-foot quartz vein, lying next to the porphyry dyke, which has a strike N. 40° E. (mag.), and is reported to carry values in free gold, The property has not been worked for some time, and the workings were so obscured as to render inspection very difficult.

Porto Rico.

The *Porto Rico*, a few years ago, was an important shipping mine, but has not been worked for some time by the company owning it. During the year 1903, Mr. G. H. Barnhart, formerly the manager of the *Ymir* mine, took a lease of the property, and mined, during that year, 600 tons of ore, having a gross value of over $16,000. This he milled in the company's mill, the returns yielding a handsome net profit, after paying a heavy royalty. In July, 1904, Mr. Barnhart signed another lease for a period of three years, on a royalty basis, the royalty under this lease, however, being lower.

The property was not working when examined at the end of June, and the lower tunnels, for some distance in, were filled solid with ice, entrance being effected by climbing through a hole in a snowdrift at the upper level, and going down an old stope and winze. The snowfall in winter seems to be very heavy here, as most of the mill buildings have been crushed in.

The vein is regular and continuous, but small, varying in width from 6 to 36 inches, with an average of about from 18 to 20 inches. The vein cuts through a greenstone country rock at a flat angle, approximately 45°, following along a close-grained, igneous dyke, much resembling the general country rock.

The property has been developed by four adit tunnels run in on the vein for a considerable distance. Most of the ore within reach from the levels now run has been stoped out, but there is virgin ground ahead, which, there is every reason to think, is as good as that already worked. The ore mined by Mr. Barnhart was taken from the old workings, and assayed in the neighbourhood of $25 a ton, the values being in gold and silver.

The mine is located on Barrett creek, on the west side of the Nelson and Fort Sheppard Railway, and about six miles from the *Porto Rico* siding, with which point it is connected by a fairly good waggon road. On the property is a stamp-mill, connected with the mine workings by a short wire-rope tramway. The mill consists of ore-bins, a grizzly, an 8 by 10-inch crusher, a battery of 10 stamps, and three 6-foot Frue vanners. The motive power is provided by a 50 horse-power horizontal engine and two boilers, all covered by a substantial building, in which is, also, installed a 5-drill Rand air compressor and receiver, which supplies air for drills at the mine. There is also a good office, laboratory and other houses nearby. Timber, wood and water are to be had in abundance.

Spotted Horse.

The *Spotted Horse* mineral claim is located on the *Porto Rico* waggon road, about two miles below that mine. A tunnel has been driven in for about 200 feet, following on a quartz vein associated with a fine-grained greenstone dyke. Quartz from the tunnel showed particles of free gold, but the average value of the quartz as mined could not be ascertained, although a milling test had been run through the *Porto Rico* mill, which had been borrowed for the purpose. The property was not worked in 1904.

Hunter V.

The *Hunter V. Group* consists of the *Hunter V.*, *Double Standard*, and five other mineral claims, active mining being as yet confined to the two named. The property is situated about two and one-half miles to the south-east of a siding on the Nelson and Fort Sheppard Railway, two miles south of Ymir, and at an elevation of 5,700 feet above sea level. It is owned and operated by the B. C. Standard Mining Company, Ltd., a company made up chiefly of local mine officials and engineers, and of which J. J. Campbell, of Nelson, is the manager; the actual mining operations being in charge of the mine superintendent. The property is in many ways unique, and is, therefore, the most interestingin the district.

The deposit occurs in a belt of limestone, in some places almost a marble, which runs in a general north and south direction for miles, and is bounded on either side by granite, of which, with other rocks of similar origin, the general formation of the locality is made up. The ore-body is practically a part of a bed of limestone, impregnated in certain parts with fine-grained sulphides carrying silver values. These impregnations do not appear to follow any visible line of fissuring, although they do seem to run in chutes, which, starting with a narrow outcrop, appear to dip at a flat angle into the hill, widening as they go, but showing no defined limits.

Towards the centre of the chute the impregnations are strong, but gradually shade away into the country limestone. The mineral-depositing solutions seem to have been highly silicious, the silica now in the ore-body often amounting to 25 per cent., being a partial replacement of the lime, while the limestone away from the local mineralisation is a comparatively pure carbonate of lime.

These local mineralisations do not seem to be directly connected with the granite in the vicinity, and they are not on, or near, the contact; in fact, no mineralisation has been dicovered here on the contact, where the limestone seems, if anything, to be purer than at more remote points. The present workings are from 1,000 to 3,000 feet from the granite on the surface, although it is a fact that the ore chutes are dipping towards the granite mass. Where the mineralisation is strongest, very high assays in silver have been obtained. In working on a commercial scale, in deposits of this class, mining is carried into the lime as far as the mineralisation is sufficient to render the work profitable, and this naturally reduces the average assay of the ore as shipped, which is found, on the large shipments made, to run about from 6 to 8 ounces of silver to the ton, and about 80 cents in gold values, with from 15 to 25 per cent. silica, the balance being lime.

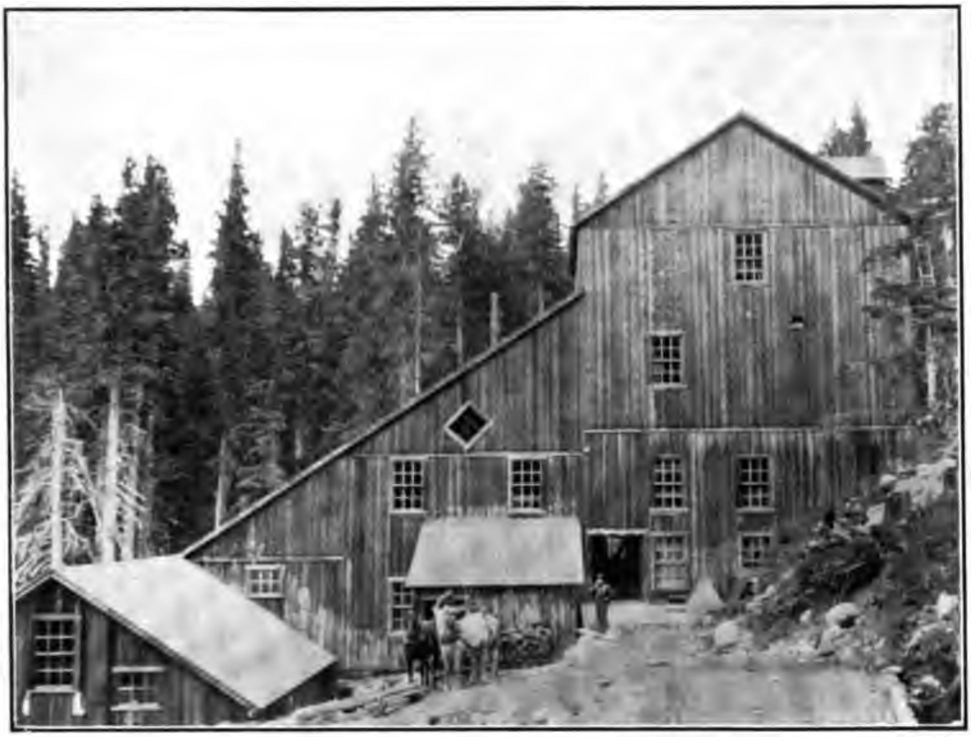
On an ordinary ore, subject to a regular freight and treatment charge, these values would not indicate a profit, but the gangue of this is so exceedingly desirable for fluxing purposes at the various local smelters, that the ore is bought as "mineralised flux," practically full contents value being paid for it. The following analysis of the ore has been obtained from one of the smelters using it in quantity:—Flux ore with low silver values; silica, 12 per cent.; lime, 45 per cent.; with a smaller amount of ore carrying higher silver values, with 25 to 30 per cent. silica and 30 per cent. lime.

The shipments during tho year have been as follows: February, 541 tons; March, 1,194 tons; April, 1,573 tons; May, 1,964 tons; June, 1,258 tons; July, 1,447 tons; August, 1,703 tons; September, 1,537 tons; October, 1,508 tons; November, 2,295 tons; December, 2,146 tons.

The mine is peculiar, therefore, in that its output is practically limited by the requirements of the smelters for flux such as it produces. In June the average daily shipment ran from 50 to 75 tons, but since that time an outlet for a greater quantity of ore has been obtained, and the manager writes that the present output amounts to two or three cars daily, which will be continued during the winter months.

Mining is carried on on what is locally known as the "glory hole" system—that is, large open pits in which the general trend of the mineralisation is followed. Of these pits there were two in operation in June. An average of 20 men are employed at the mines, the drilling being done by hand. The mine buildings consist of bunk-houses, cook-house, superintendent's house and quarters, blacksmith shop, and stables.

From a point just below where work is expected to be ultimately carried on, a Riblet aerial tramway, with half-ton buckets, has been built to the siding on the Nelson & Fort Sheppard Railway, a distance of about 12,500 feet, at which point bunkers have been built, from which the ore is loaded by chutes into cars. The ore from the present workings is conveyed to the bunkers at the upper terminal of the main tramway by two separate auxiliary back-balance tramways, respectively 500 and 1,800 feet in length. The main tramway is operated by two men; the one at the top loads the ore and "brakes" the tram, while the other attends to the dumping, the loading on of supplies to be taken up to the mine, and the loading of the ore into the railway cars.



RELIEF GOLD MINING CO.'S CONCENTRATOR, ERIE, NELSON M. D.

VIEW FROM SKYLARK TRAIL–LOOKING ACROSS SLOCAN LAKE.

Second Relief.

The *Second Relief* mine is situated on the main north fork of the Salmon river, about 13 miles from the town of Erie, on the Nelson & Fort Sheppard Railway, and is owned by the Relief Gold Mining Co., J. A. Finch, Secretary, Spokane. The mine and mill are under the charge of the local superintendent, William Anderson. A good waggon road extends from Erie to the mines, and over it the concentrates are hauled. The property is developed by four cross-cut tunnels—Nos. 0, 1, 2 and 3. No. 0 is a short tunnel, cutting the vein in a few feet, and from this drifts have been run north and south for the length of the pay chute. No. 1 tunnel is about 90 feet below the surface, and it is 150 feet in to the vein, from which point drifts have been run 150 feet both to north and south. No. 2 is 225 feet long before cutting the vein, and drifting has been done to the south for 60 feet and to the north for about 800 feet. This tunnel is 180 feet vertical below No. 1. No. 3 cross-cut is 134 feet below No. 2, and it is 275 feet into the vein. on which a drift runs to the north 450 feet. The vein is of an average width of from 18 to 24 inches, and dips to the west at an angle of 85 degrees. The property is being worked most economically, with no waste labor, a total of 19 men covering the entire mine staff, both below and above ground.

A short distance below the mill, and connected therewith by a gravity surface tram, is the Company's stamp mill. The ore is received from the tram into a large bin, from which it is fed to a 6 by 12-inch crusher, which in turn discharges into the feed-bins, from which the ore is fed by an automatic feed to two 5-stamp batteries using 850-lb. stamps. The mill plates are 12 feet long, and on these is recovered about 35 % of the values. The tailings from the plates pass on to two Wilfley tables, where the remaining values are saved as concentrates.

The mill has a capacity of about 25 tons a day when crushing to 40 mesh. The tables produce about two tons of concentrates a day, which have a value of about $66 per ton. The machinery is operated by water, under a head of 178 feet, utilised through three Pelton wheels. A separate wheel is provided for the stamps and crusher, and another drives the Wilfleys and a lighting dynamo. The mill is also equipped with a small cyanide plant, consisting of 6 leachers, 2 solution tanks, 1 storage tank, and the usual zinc-boxes. This plant was in use in 1902 and 1903, but it is reported not to have been an economic success, so its further use was abandoned.

Arlington.

The *Arlington* (Erie) mine is operated by the Hastings (B. C.) Exploration Syndicate, Ltd., of which Mr. Leslie Hill, of Nelson, is the manager and consulting engineer, and Mr. Barker is mine superintendent at Erie. The mine is situated about two to three miles from the town of Erie, and is reached by a waggon road branching off the *Relief* road. The ore deposit is a flat blanket lead of quartz, occurring in a country rock of soft, black, graphitic slates, the quartz being accompanied by a light-coloured acidic dyke, inclined to be porphyritic in structure, both of which follow together the bedding planes of these slates, and are subject to all the flexures and bendings of this class of formation. Not only is the vein much affected by "rolls," but there is at least one fault of a considerable throw, which very much complicated operations before the details of such fault had been definitely determined. The quartz vein has an average width of about 25 inches, and carries through the quartz, galena, iron pyrites and zinc blende. The ore is easily sorted by hand. The values amount to about $50 a ton on the sorted ore, and are chiefly in gold, with a little silver, these metals occurring in the proportion of about $20 to $1, as to values.

The report of the company for its last fiscal year gives the average gross assay value of ore shipped during the year (1,068 tons) as: Gold, $52.40 to ton; silver, $3.73—a total of $56.13. The gross profit for each ton of ore shipped was $13.73, and the gross profit for the year was

$14,666. The tonnage output of the mine is from 3 to 3½ tons a day, and the cost of mining and hauling to the railway at Erie is given as $30.60 per ton. The total force employed about the mine, "all hands and the cook," as the superintendent puts it, was 22 men.

A small mill had been built on the property and connected with the workings by an aerial tramway. The mill equipment consists of 2 Tremaine stamps, 2 Frue vanners and 1 Wilfley. The mill has not been used of late, as the ore can be so cleanly sorted at the mine by hand as to leave little or no second-grade product to send to the mill.

In the same vicinity, on the main north fork of the Salmon river, there are a number of other mineral claims, some of which have shipped ore, but as none of them had produced, and as they were not being operated in July, 1904, they were not personally visited.

On one of these, the *Canadian King*, which in 1903 shipped over 90 tons of ore, one man was employed pumping out the mine. Between 30 and 40 tons of ore have been shipped in 1904 by the lessee.

On the *Keystone*, which in 1903 shipped nearly 250 tons of ore, two men were engaged working "on tribute."

At Craigtown, about half-way to the *Relief*, a large body of copper ore is reported, and it was expected that during the season active steps would be taken to develop the showing.

Placer Mining.

About the only placer mining operations being carried on in the district are near Erie, on the north fork of the Salmon river, at the canyon, just below where Whiskey creek flows in. The river in this vicinity shows evidence of having been mined for placer gold in the early days, but of the success of these operations there is no official record.

Mr. J. J. L. Peale, and Mr. W. L. Boyd have located two 250-foot claims, the *Full Dinner Pail* and the *Walla Walla*, on the north side of the river, just below Whiskey creek, on what is evidently an old channel, which contains a well water-worn gravel wash, evidently of local, and probably of recent, origin, made up of boulders of granite, porphyry, gabro and greenstone, but no slate. These two men were at work, having just about got started ground-sluicing, the work being intended to prospect the property, and if satisfactory results are obtained, it is expected the claims will be consolidated and water brought on under a head of 150 feet from Whiskey creek, which appears to be able to supply a sufficient quantity. They had recovered, at that time, a small quantity of gold, which was fairly coarse, well worn, and promising in appearance. The largest piece found was about $1 in value, although it is said that a piece worth $6 had been obtained from the claims by the discoverer.

Immediately above these claims on the main fork, above the mouth of Whiskey creek, W. A. Nichols, of Spokane, has two leases, the *Spokane* and *Erie*; and, immediately above these again, the North Fork Co., J. C. Allan, Spokane, holds one or more leases, but on none of these was there any work being done.

Queen.

The *Queen Group* adjoins the *Yellowstone* on Wolf creek, a tributary of Sheep creek, which latter is an important tributary of the Salmon river, entering it from the east at the town of Salmo. From Salmo to the mine there is a waggon road, the distance being about 10 miles. In 1902 this property was under lease and bond to the Holmes Syndicate, which shipped and milled about 5,000 tons of ore, containing values of about $27,000, but towards the end of the year threw up the bond.

It would look, from the appearance of the mine, as if little had been spent on development, but that all the energy had been expended in taking out all available ore. In 1903 Mr. Wm. Waldie, of Nelson, one of the owners, started in to work the property and still continues to do so. In 1903 he leased the *Yellowstone* mill, which was lying idle, connected it with the *Queen* mine by a surface tramway and made some small shipments, and from appearances, in July, was in a fair way to make a considerable tonnage in 1904. Later reports show that nearly 5,000 tons of ore were milled during the year.

The mine occurs in a band of quartzite, here traversed by a dark igneous dyke. The mineralisation occurs in the quartzite adjacent to the dyke, and gradually shades off into barren country rock, the ore taking the form of two chimneys with a width of from 2 to 14 feet, and a greatest developed length of from 100 to 125 feet, tapering somewhat towards the top.

When visited, ore had been found on one side only of the dyke mentioned, no attempt having been made to see what was on the other side. It is reported that, later in the summer, a drift was put through the dyke and that good ore was encountered. The milling ore runs about $7 to the ton.

The mine is developed by three adit tunnels, connected by a raise, but has been so "gutted" by former lessees that the present management has difficulty in getting into systematic mining. Air drills are used in the mine, the compressed air being generated at the mill. About 10 men are employed underground and as many above.

The *Yellowstone* mill was completed in 1900, crushing that year 8,500 tons of ore. The equipment consists of two batteries of five stamps each, the weight of stamp being 850 lbs. In the mill building is a large air compressor. The whole plant is operated by water-power, under a head of about 300 feet. The *Yellowstone* mine has not been operated for two or three years.

Summit Creek.

Summit creek has its source in the range of mountains separating the drainage area of the Salmon river, in the Ymir district, from that of the southern portion of Kootenay lake. The source of Sheep creek, on which the *Yellowstone* and *Queen* mines are situated, and that of Summit creek are only a few miles apart and separated by a divide. Summit creek is about 30 miles long and flows due east, entering the Kootenay river from the west, about opposite the flats upon which the Reclamation Farm is situated, that is, between Creston and Sirdar. It was by this route that the Dewdney trail was laid out from the Coast to East Kootenay in the '60s. Crossing the Kootenay river above Fort Sheppard, it proceeded up the Salmon river to Sheep creek, which was followed up to its source, and crossed the divide to the head of Summit creek, which it followed down to the Kootenay river, crossing it at the Flats, and proceeding up Goat river over the summit and thence up the Moyie to East Kootenay, where, in those days, extensive placer mining operationg were in progress.

Of this slope of the range, draining eastward into Kootenay lake, very little is known, and until recently it has been little prospected, although, in its geological features, it is very similar to the western slope, where several valuable properties have been developed.

The Provincial Mineralogist, in the Annual Report, 1903 (p. 147), drew attention to a property on Midge creek which had exceedingly good prospects, and now, on Summit creek, the *Bayonne Group* has come into prominence from the high assays obtained from surface showings or shallow workings. These properties were located in 1901 by G. Harrison and F. Risdon, two prospectors, who, by the expenditure of a large amount of personal labour, brought the claims to such a state of development as to enable them to be Crown-granted. The group has recently been taken over by a syndicate, composed of Montana mining men, for, it is reported, a cash payment of $80,000, and surveys of the group have been completed. The group consists of 10 claims, the *Bayonne*, *Oxford*, *Columbus*, *New Jersey*, *Ohio*, *Delaware*, *Maryland*, *Kentucky*, *Illinois* and *Virginia*.

Bayonne Group.

A quartz ledge, varying in width from 2 to 15 or 18 feet, with indefinitely determined walls, cuts through the granite formation for a long distance, and has been located with considerable exactness on the surface by a number of open cuts and trenches. This lead strikes up the hill in a general east and west direction, its course being often determinable by the "gossan" capping caused by the weathering of the iron sulphides which form a part of the vein matter.

On the *Ohio* a tunnel has been run in for 360 feet on a fissure containing from 3 to 4 feet of talcose matter and quartz. The surface slopes at such a low angle that the face of the tunnel is estimated at not over 70 feet deep.

A sample taken by the writer from the walls of the tunnel at various places, and quite sufficiently general to give an approximate valuation to the exposure, gave upon assay in the Government Assay Office, $11.60 in gold and 10.22 oz. in silver to the ton. A sample taken of the 18-inch "pay streak" at the face of the tunnel gave, similarly, $26.40 in gold and 3.28 oz. in silver. A general sample taken across 3 to 4 feet of ledge matter exposed on the surface, some 220 feet above the tunnel, gave $13.20 in gold and 6.2 oz. in silver. A general sample from quartz at the tunnel gave, similarly, gold $16 and silver 4.2 oz., while a sample of certain black weathered gossan from the outcrop of one of the leads, taken merely to see if it carried anything, for nothing was visible, gave the astonishingly high assay of $320 in gold and 40 oz. in silver.

On the *Bayonne* claim a tunnel has been run in 500 to 600 feet, but seems in its course to have run off the vein, which, however, is picked up again near the face, and has been drifted on for 50 feet. This tunnel is likewise shallow.

The strongest points about the mineralisation, as so far developed, are the persistency of the lead or leads and of the good values contained, for the assays quoted above are not selected, but are the assays from all the samples taken. It is true that the development is as yet superficial, but the length and strength of the mineralisation argues strongly for depth. As it stands, the property is one of the most promising prospects seen in the district, and there is more than a probability that development will prove it to be a mine.

Encouraged by the success met with on the *Bayonne*, a large number of claims have been staked in the vicinity, as is usually the case where a fortunate location has been made, but as these stakings are mostly recent and the surface wash is heavy, there is as yet little definite to show what may be expected.

Echo Group.

Among those who have succeeded in obtaining results are the owners of the *Echo Group* who, after a deal of laborious trenching and sinking of test pits, have managed to uncover a ledge of quartz 3 to 4 feet wide, carrying gold values, closely associated with a light-coloured acid dyke, cutting through the granite formation. This cut was made just when the writer visited the property in the middle of July, and as the ground was more or less covered with snow from a recent storm, little could be then determined. It is reported later, unofficially, that development has proved the continuance of the lead, and that the values obtained are good. The lead is not a continuation of the *Bayonne* lead, but seems to be parallel, though some distance away.

The group lies about half a mile to the south-east of the *Bayonne Group* and is supposed to adjoin it. It consists of four claims, the *Echo*, *St. Elmo*, *Ontario* and *Echo Fraction*, owned by John Baugh, Howard Anderson and Wm. Mahar.

There are a number of other claims in the camp, reported to have equally good showings but very little work done, and they were not visited.

Bayonne camp is at an altitude of from 6,000 to 8,000 feet, and 28 miles, by a very inferior trail, from the navigable waters of Kootenay lake. The mouth of Summit creek is reached from Kootenay landing, or from Sirdar, by row boat or canoe, but a steamer can, at most seasons, go from the lake to a point on the west shore of the river, some three miles north of the mouth of the creek, and from this point it is proposed to build a waggon road up the creek. At present, the trail follows a little back from the shore to the mouth of the creek, where it joins the old Dewdney trail, which it follows up for about 10 miles or so, when the trail to the camp branches off to the right and, from this point, is new, having been built by the prospectors and being very "makeshift" in location and construction. The Dewdney trail must have been, at one time, fairly good, but slides and falling timber have caused breaks, around which the new trail has been temporarily carried, irrespective of grades. The camp can also be reached from Salmo, on the Nelson and Fort Sheppard Railway, by proceeding up Sheep creek and over the summit. This route is frequently used by prospectors "travelling light," but all supplies are brought up Summit creek.

Alice Mine.

The Alice Broughton Mining Co., Ltd., of which John Hampson is manager, is operating the *Alice*, *Alice Fraction* and *Morning Star* mineral claims, situated in the Goat river section of the Nelson Mining Division, about 2 miles north of Creston station, on the Crow's Nest Pass branch of the Canadian Pacific Railway. The mine is situated on the range of hills separating Goat river from the Kootenay at the flats, at a height above the railway of from 1,500 to 2,000 feet. A strong quartz ledge has been traced continuously on the surface for a distance of nearly 800 feet, and intermittently for much further. The ledge was primarily developed by a number of open cuts, etc., from which indications sufficiently encouraging were obtained to induce the more serious development of the property. This was done by driving in No. 1 cross-cut tunnel, which cut the ledge at a depth of 95 feet below the surface, and on this level drifting was done on the vein to the amount of 455 feet, and a winze was sunk for 82 feet, from which at this point an intermediate level was run, and about 195 feet of drifting done. About 70 feet below the intermediate level is No. 2 level, which was driven from No. 2 adit cross-cut, and on which

No stoping had been done when the property was visited in July, 1904, only the levels and cross-cuts being run, which, however, may be said to have blocked out the mine to a depth of 250 feet, and for a length of about 400 feet. The ore is essentially quartz, containing galena, which carries silver values of about $\frac{1}{3}$ of an ounce of silver to the per cent. of lead.

The property is entirely a concentrating proposition. A concentrator site was acquired on the Canadian Pacific Railway, at what is now known as Alice Siding, where, in July, a concentrating mill, designed by S. S. Fowler, of Nelson, was in process of construction, as was also a Riblet aerial tramway connecting the mine and the mill. The mill was first put in operation about the middle of September, 1904, since when it has passed through a considerable tonnage of ore.

Granite-Poorman.

The Duncan United Mines, Ltd., owning the *Granite-Poorman* and other claims, located on Eagle creek, some five or six miles to the west of Nelson, did not work the property this past year, but let it out under a lease to S. S. Fowler and Montague Davys, of Nelson. The lessees began operations about July, 1904, and up to the close of the year they had mined and milled about 1,100 tons of ore, gathered probably from the old workings, which is reported to have yielded nearly $10 a ton.

Central.

About five or six miles west of Nelson, on the hill above the *Poorman-Granite* properties, at an elevation of about 2,200 feet above the level of the lake, is the *Central* mineral claim, owned by D. W. Moore and John Whittier. The property is only just being developed, and while as yet it is nothing more than a prospect, it certainly has a very encouraging showing.

The country rock of the locality is granite, and in the vicinity of the workings is cut by several "iron-mica dykes," which have a strike about S. 55° E. and a dip of about 85°. The lead has been stripped and cross-cut for some 200 feet, and traced further. In the largest of the open cuts, where the lead has been cross-cut, it appears to be about 18 feet across, and between the granite walls is included a basic dyke, such as mentioned, which is probably associated with the mineralisation.

A few feet from this open cut a shaft was being sunk, and was down in September about 21 feet, showing a well-defined wall on one side, while the width of the shaft (6 feet), was in mineralised vein matter. The owners, who are men accustomed to sampling, sampled the shaft across at a depth of 15 feet, obtaining from such sample an assay of 5 % copper, $11 in gold, and 2.5 oz. in silver. General samples from the dump of the material hoisted from the shaft are reported as:—Sample No. 1, copper 3 %, silver 1.4 oz., and gold $7.20 to the ton. No. 2, taken at another time, gave: Copper 2.7 %, silver 1.4 oz., and gold $6 to the ton. Hand-picked samples of ore gave: Copper 9.3 %, silver 8 oz., and gold $19.

Fluor Spar.

A short distance to the east of Nelson, at 5-Mile point, fluor spar has recently been discovered, and, as far as is reported, this is the only known occurrence of the mineral in the Province, which gives any promise of its existence in commercial quantities. The claim lies just above the Nelson and Fort Sheppard railway tracks, and within 100 yards of the hand-car house at 5-Mile point station. The property is owned by Geo. Huston, Hawkins and others, of Sandon. The country rock here is also the Nelson granite, and running through the claim there is in the formation a fault plane or fissure, along which the granite has been much crushed, and subsequently somewhat decomposed by percolating water. Along this fissure calcium fluoride has been deposited, the crushed rock on either side being impregnated for some distance, gradually shading off into more solid granite.

Along this fissure for some 75 feet a tunnel has been run in which shows in the roof in places a seam of about 12 inches of the mineral, comparatively pure. On either side the mineral is more or less mixed with the crushed country rock. The deposit is recent, and, as a matter of fact, the water seeping through the fissure at present is depositing the mineral, as in places the walls of the tunnel, which was driven some years ago, show a distinct deposit of fluor spar deposited there recently. The mineralisation followed the fissure at least as far as the tunnel had developed it, and nothing could be seen on the surface, which is covered with underbrush.

The mineral is used commercially as a flux in smelting, and in the manufacture of hydrofluoric acid, for both of which purposes there would be a strong local market if the future development of the property proves satisfactory.

The Hall Mines smelter took hold of the property this fall, and did some work on it, mining some tons of the mineral for experimental purposes, the result of which operations has not been learned, further than that, mined in quantity from the present development, the mineral contained a higher amount of silica than was desirable.

NELSON MINING DIVISION.*

REPORT OF ROBERT A. RENWICK, GOLD COMMISSIONER.

Marked development in the condition of almost all the mines in the Nelson Mining Division may be summed up as the result of the year's operations. On the whole, it has been a year of development rather than of prospecting.

With respect to smelting, the results secured by the Hall Mines Company were appreciably better than those of the previous year, though still leaving much to be desired, and in the same company's mine, the *Silver King*, operations under lease were sufficiently encouraging to induce the company to decide upon unwatering the lower levels, and to resume operations upon a partnership basis.

There was a falling off of results in the operations at the *Athabasca-Venus* property, both in the tonnage mined and in the recovered values, but on the *Juno*, an adjoining property, development was attended with such satisfactory results that arrangements have been made for the erection of a stamp-mill during the approaching summer.

At the *May* and *Jennie* property, in the gold belt to the south-west of Nelson, a 50-ton mill has been erected, and will commence grinding on the large reserves of ore blocked out in the mine during the early months of 1905.

On the *Poorman-Granite* property operations were carried on under lease, after an idle period of several months, and resultant development may bring about a resumption of operations on the *Granite*; while operations on the *Greenhorn*, in the same locality, have opened up a strong ledge of free-milling quartz, from which there was an extraction of 473 tons, the milling of which yielded paying values.

In the Ymir camp the only disappointment was in the *Ymir* mine. The net result here was a reduced ore extraction and a general shrinking of values. At the *Hunter V.* mine, development was carried on so effectively that the output of the mine was increased from 400 tons up to 17,168 tons. At the *Wilcox*, also, sufficient improvement in the mine resulted to warrant the management in doubling the milling capacity; and on the *Foghorn* the owners claim the opening up in the long tunnel of an ore-body of sufficient importance to warrant the erection of a concentrator.

At the *Porto Rico* mine, after a period of idleness extending over a number of years, operations have been resumed under a lease, and with such gratifying results as ensure operations upon an even more extensive scale during the coming year.

Above Erie good returns have been received from the operation of the *Arlington* mine, and the property is now said to be in a better position with respect to ore reserves than at any former period in its development. At the *Second Relief* mine profitable operations were carried on for a short period, and arrangements are being perfected for the taking over of the property by a local company, which will operate for twelve months in the year.

Near Creston, satisfactory development was followed by the erection of a 50-ton concentrator, which was in operation during the closing weeks of the year; and, at the *Bayonne*, systematic development was carried on by the purchasers with such encouraging results that expenditures aggregating several thousand dollars have been decided upon for the coming year, including the expenditure of $30,000 on a waggon road to connect the property with Kootenay lake.

See also Report of Provincial Mineralogist, page 122.

These conditions have resulted in a considerable gain in the mineral output of the district, and, in addition, have furnished employment for a larger number of men than for several years previous.

Hall Mining & Smelting Co.

The operations of this company during the fiscal year ending June 30th, 1904, resulted in a net profit of £1,696 16s. 1d. In mining, operations on the company's account were confined to the *Emma* mine, in the Boundary District, in which the company has a quarter interest, and from which the supply of fluxing ore for the smelter is drawn. Throughout the year, work was carried on in the upper levels of the *Silver King* mine by M. S. Davys, lessee, during which period 4,341 tons of ore were extracted. The average value of this ore per ton was 21.4 ounces silver and 3.66 % copper, and the tribute received by the company upon it amounted to £804 19s. The net profit shown in the company's mine account is £1,042 12s. 1d.

At the company's smelter, No. 1 furnace was in operation 204 days, and No. 2 for 324 days, smelting 22,805 tons of custom ore and 9,331 tons of *Emma* ore, and producing 6,155 tons of lead bullion. In addition to this, No. 1 furnace was in operation 27 days on *Silver King* ore, producing 140 tons of copper matte, the latter being "converted" at the Granby works. The tonnage of lead ore was made up of 14,169 tons of lead ore and concentrates, a large proportion of which was roasted, 5,915 tons of dry ore, and 2,721 tons of *Hunter V.* ore. These figures show an increase of 6,025 tons of ore, and 1,845 tons of *Emma* ore, over the previous year's smelting operations. The smelting management reports the ore supply as very unsatisfactory during the first six months of the year.

The lead bullion shipped carried 1,096,415 ounces silver and 9,201 ounces gold, while the copper matte carried 41,294 ounces silver, 130 ounces gold and 130,800 pounds copper, making the gross value for the year practically $1,000,000. Despite the volume of business represented by these figures, the profit on smelting operations was but £8,394 8s. 6d., and this in turn was subject to the heavy charge of £4,550 13s. 2d. for the maintenance of buildings and plant, reducing the smelting profit to £3,843 15s. 4d.

Respecting the outlook for the present year, it is worthy of note that the conditions during the last half of the last fiscal year showed an appreciable improvement, which was maintained during the last six months of the calendar year, and conditions generally promise better.

In the *Emma* mine, present development assures an ample supply of iron flux, and the grade of the ore has also improved. The satisfactory development at the *Hunter V.* mine is also considered important, the ore from this property carrying a very high excess of lime, thus rendering unnecessary the purchase of lime rock. The owners of the property have an expanding market, and have plans for development under way which will cheapen the cost of production and ensure also an ample supply of ore.

The outlook for a constant supply of lead ores is also brighter. This supply was materially curtailed during the last six months by the water shortage at the *St. Eugene* mine, the largest producer in the Province. To overcome this, the company has installed a pump, and for the future will draw its water supply from Moyie lake. Another factor likely to improve local smelting conditions is the probability that the entire output of the *St. Eugene* mine will be treated locally. Heretofore a considerable proportion of this mine output was exported to Europe for treatment. It is understood that this arrangement has not been altogether satisfactory, and that the export of *St. Eugene* ore will cease after June 30th next. The treatment of this ore in the local smelters would go a long way towards securing for them a constant supply of lead ore, which, with the normal increase to be expected from the Slocan

District, following its further period of development, should satisfactorily adjust this issue. It is only with respect to the supply of dry ore that the outlook has not improved, there being but one regular producer at the present time. Conditions with respect to labour and fuel supply remain the same.

Improvements made in the smelter plant during the year consist of the building of a Merton roasting furnace, and improvements in the way of increasing the elevating capacity in the handling of material. The introduction of the Merton furnace is, in a measure, experimental. It is expected to reduce roasting charges, and the successful operation of the present furnace will mean the introduction of others. There was no increase made during the year in the smelting charges upon lead ores, and the charges on dry ores were also practically the same.

During the half-year ending December 31st, 1904, the No. 1 furnace was in blast 131 days, and No. 2 was in blast 158 days. During the period 8,206 tons of lead ores and concentrates, and 9,803 tons of other ores, were smelted; and 3,821 tons of bullion of a value of $559,340 were shipped, as against 3,406 tons of a value of $518,071 for the corresponding period of last year.

The smelter furnishes employment for an average of 125 men throughout the year. The wages paid for the last six months of the calendar year aggregated $71,224.12, and for the year $141,542.62.

Silver King Mine. This property was operated during the greater portion of the year by M. S. Davys, under a lease which expired in July last. His work was confined to the fifth and upper levels of the mine, the ore extraction during the period being 4,000 tons, with a value slightly in excess of $16 a ton. Following the lapse of the Davys lease, and while negotiations were pending for the future working of the property, a short term lease was given to a number of miners, who, in a few weeks extracted 191 tons from the hanging-wall vein, the average value of which was in excess of $50 per ton. Operations at the mine furnished employment for 20 men during the greater part of the year.

The present arrangement for the operation of the mine is in the nature of a partnership between Mr. Davys and the Hall Mining & Smelting Company, and calls for the unwatering of the mine to the seventh level, 175 feet below the No. 5. The principal aim of this work is to reach a body of ore left in the south vein, which, where extracted in the upper levels, yielded ½ % copper and from 18 to 25 ounces silver. In the earlier stages of the mine's development this vein was stoped down as far as the fifth level, and had been opened up on the sixth in 1899, since which time no development has been done upon it. On the fifth level this vein had an average width of 5 feet of shipping ore, and between this level and the seventh it is estimated that the vein contains 10,000 tons of ore.

It is also proposed to prospect the main vein below the seventh level with a diamond drill. All work done in the mine below the seventh level has been on what is known as the hanging-wall vein, and it was this vein that "petered out." In the seventh level the main vein was faulted, and the values in the ore having fallen, work upon it was discontinued. Behind the fault mentioned, and at a depth of 1,200 feet, diamond drill cores indicated a body of solid grey copper in the main vein, assays upon which gave an indicated value of 16 to 18 ounces silver and 2 % copper. It is this ore-body which it is intended to explore by means of the diamond drill, operating from the seventh level. The tapping of this ore body would involve a very heavy expenditure on capital account, but should the exploration indicate an extensive body, and not a pocket, of ore, it will be worth going after, as the main vein has maintained an average width of 12 feet in the upper workings.

Athabasca-Venus Mines.

These properties were operated throughout the year by the Athabasca-Venus Gold Mining Company, but late in December operations were suspended. It is suggested that the property is not able to carry the debts of the two former companies, which were amalgamated in the new company, and to provide also means for necessary development. Some other arrangement is admitted to be necessary before operations can be resumed. During the year the *Venus* property received the chief attention of the management, and from it 6,546 tons of ore were extracted. Some work was done on the *Athabasca* property, but it was under the tribute system or lease, the ore extraction being but 479 tons.

With the exception of two months, during which there was a scarcity of water, the mill was in operation throughout the year. There were milled 7,000 tons of ore, yielding $66,260.

The mines and mill furnish employment for a crew of 35 men during the year.

The Juno Mines.

This property comprises a group of three claims, situated on Morning mountain, and immediately adjoining the *Venus* property. It is owned and being developed by the Juno Mines, Limited, a Montreal syndicate, with a capital of $625,000, of which one-third is in the treasury. M. S. Logan, of Nelson, is the managing director and has had personal charge of development.

Two veins have been opened up, the main or *Juno* vein running east and west, and the *Venus* vein north and south. On the *Juno* vein a shaft has been sunk 300 feet, and at the 100 and 200-foot levels drifts of an aggregate length of 500 feet have been run on the vein. An adit 800 feet long has been run to connect with the bottom of the shaft. The vein appears to maintain an average width of 4 feet, and samples all the way from $5 to $20 in gold.

The *Venus* vein has been opened up to the *Juno* side line by the Athabasca-Venus Company on the three upper levels run on the *Venus*, the lowest of which gives a depth of 550 feet below the *Juno* adit. Arrangements were made by which the Juno company worked through the *Venus* tunnels, and the No. 2 tunnel of the *Venus* has been extended into the *Juno* ground for a distance of 300 feet. At a point 100 feet in from the *Juno* side line, an upraise has been made 550 feet to connect with the *Juno* adit. The No. 1A tunnel on the *Venus* has also been advanced in the *Juno* to connect with the upraise. In these workings the *Venus* vein appears to maintain a width of two feet, and from results obtained on the ore extracted from the *Venus* ground it is anticipated that the ore in the *Juno* ground will mill $15 to the ton.

The company is now negotiating for a mill. By means of the connection established with the *Athabasca-Venus* property, it would be possible to utilise the tram and mill of that property, but if an arrangement of this nature is not made, the *Juno* company will erect, during the summer, a 10-stamp mill, capable of treating 25 tons per day. There is sufficient water available for washing the plates, but it would be necessary to raise the stamps by electric power.

The company employed on development a crew varying from 12 to 15 men throughout the year.

May and Jennie Mine.

This property is situated on 49-creek, and is owned by the Reliance Gold Mining Company, of Nelson. There was very little development work carried on in the mine during the year, but satisfactory progress was made in the erection of a mill for the treatment of the ore already blocked out. This mill is known as the Akron-Chilian mill, and will have a nominal capacity of 50 tons The buildings have been erected, part of the plant has been installed, and the balance of it is expected to be on the ground in 30 days. The main building is 72 by 36 feet, and the cyanide building 50 by 44 feet. A Riblet tramway has been erected, which has a length of 1,750 feet, and connects the mine with the mill, and an ore-bin capable of holding 200 tons has been built at either end.

Under the process to be introduced, the ore, after it leaves the bin, will be put through a Blake crusher and a set of rolls 14 by 36 inches, crushing to ¼ inch, and depositing into the mill ore-bin. From this it is fed into the Chilian mill, run over the plates, then into the storage tanks, and from these through the cyaniding plant. From experiments made, it is estimated that a saving of 90 per cent will be effected by the treatment to be employed.

In the mine the underground workings aggregate half a mile in length, the greatest depth being 235 feet. This has resulted in opening up ore reserves aggregating 80,000 tons, the average value of which is expected to be in the neighbourhood of $4 to the ton. As conditions permit of the handling of the output by gravity from the mine through the mill, it is expected that a good profit margin will result from mining and milling operations. The probabilities are that the mill will be in operation by the end of April, and preliminary work will be commenced in the mine a few weeks in advance.

Gold Hill Group.

Very little work was done on this property during the year. It has been opened up by a 650-foot cross-cut and a 100-foot drift. A 4-foot ledge was encountered in this drift, and an upraise was made on it for 35 feet, when it was found to be cut off by a dyke. A shaft was then sunk on the vein, and it was showing strong in the bottom at 30 feet. Some surface prospecting was carried on by means of ground-sluicing, but without important results.

Poorman-Granite Mines.

Mining operations were carried on in these properties during a portion of the year by M. S. Davys, under a lease, a crew of 15 men being employed. The *Granite* received the most attention. This vein has been opened up by a shaft down 280 feet, off which four levels have been run. The showing above the lower level consists of stringers of ore averaging from two to six inches in width, with occasional bunches widening out to two feet. In the lower level, however, there is a chute of ore 50 feet in length, which maintains an average width of 2 feet. The work done consisted in following stringers on the upper levels, and stoping out ore as long as it covered expenses, the ore extracted milling $11 to the ton. The development of the ore chute in the fourth level has also been undertaken. It is proposed to sink another 60 feet on this, and if the ore holds in value and extent, the lessee will go down another 40 feet.

The work in the *Poorman* consisted in stoping out such ore as remained available. In all 270 tons of ore were extracted, but as it did not mill above $5.50, further work was abandoned. The ore extraction from the *Granite* property amounted to 800 tons, and yielded values approximating $11.

Greenhorn Mine.

Considerable work on this property was done during the year by the owners, Messrs. Swedberg & Nelson, 300 feet of tunnel being driven, of which 75 feet are on the vein. Conditions for mining in the *Greenhorn* appear to be more favorable than in the adjoining properties, the vein being wider and free from the walls. Considerable ore was extracted, and 473 tons of quartz were treated in the *Granite* mill, yielding something over $10 a ton. A crew of ten men was employed during the greater portion of the year. Future operations will, in a very great measure, turn upon the terms that can be secured for the milling of the ore.

Star Mine.

This property, which is situate on Eagle creek, was operated under lease and bond for a portion of the year by the Sharpless Mining Company, and had been opened up by a shaft down 90 feet, from which some drifting had been carried forward, showing a vein of gold quartz varying from two to four feet in width, the ore in which milled a little better than $10. The operators made a cash payment of $3,000 upon their bond, paid about as much more for milling privileges at the *Granite* mill, spent $5,000 on surface improvements in the way of buildings, and then entered into a contract to deliver 40 tons of ore per day. To make this good, country rock was broken down and shipped with the ore. In all, close upon 1,200 tons of material were teamed to the mill, but the average recovery was less than $3 per ton, or less than the charges for teaming and treatment, and a few weeks brought about a suspension of operations. The work done in the mine did not alter the appearance of the vein.

Eureka Group.

This group of claims adjoins the *Star* property, and received attention from the owner with a view to giving a lease and bond upon it, under the terms of which operations are to be carried on during the ensuing year. Two ledges on the property have been opened up by shafts 86 and 75 feet respectively, and an incline of 40 feet. From these some drifting has been done and very favourable showings disclosed. One of the veins has a width of 5 feet, and the ore gives indicated copper values of $18 in gold and copper, with a rich streak on the hanging-wall, from three to six inches wide, from which assays have been had as high as $60. It is this vein that has been developed by the shafts. The parallel vein has been opened up by the incline shaft and 20 feet of drifting. It has a width of 4 feet, and the ore an indicated gold value of $5, with very small copper values.

Molly Gibson Mine.

This property, situate on Kokanee creek, has been under development since August last, after a protracted shut-down. The company was called upon to make considerable expenditures to repair the tramway and mine buildings destroyed by the snow-slide of two years ago, when a number of the miners were killed. There are two veins on the property, which are being opened up by means of tunnels. The work accomplished since operations have been resumed consists in advancing the No. 4 and No. 5 tunnels another 100 feet each, and in advancing an upraise 90 feet, to prospect for a chute of high-grade ore which in the upper workings yielded from 300 to 400 oz. of silver. The work so far has opened up a considerable tonnage which it is estimated can be milled eight into one, making a concentrate averaging from 80 to 100 oz. silver and 25 % lead. The company has under consideration the erection of a concentrator, but the experiments, so far as they have been carried on, have not been conclusive as to the best method to be employed. These have shown a saving of but 70 % of the values, and it is not contemplated that milling results would be as good.

In the former operations nothing but high-grade ore was shipped, and in addition to the large reserves of concentrating ore in the mine, there are 5,000 tons on the dumps which, it is estimated, will average from 20 to 30 oz. silver and small percentages of lead.

A crew of 20 men was employed at the mine since operations resumed.

Ymir Mines.

This property was operated throughout the year by the Ymir Gold Mines, Ltd., during which period there was mined and milled 32,630 tons of ore. This yielded by amalgamation $2.67 per ton, and concentrates of gross value $1.80 per ton of ore crushed, and also $0.45 per ton by cyaniding the tailings, making a total gross recovery per ton of $4.92 in gold, silver and lead. The concentrates are made by Frue vanners, which are set rather steep in order to throw some zinc blende into the tailings, and thus avoid a penalty from the smelters. The costs of concentrating, shipping and smelting amount to more than half the gross value of the concentrates. The costs of cyaniding, although very low, when deducted from the yield, show only a small profit on the treatment of the mill tailings.

With the exception of a small pillar of rich ore mined in No. 1 level, all the ore extracted during the year has been mined from the 4th, 5th and 6th levels, all the richer ore, from the oxidised portion of the vein above the 3rd level, having been previously exhausted.

The principal development during the year has been the extension of the 4th, 6th and 10th levels. Down to the 6th level the pay chute maintains its original length, and pitches regularly to the eastward. If this pitch of the pay chute continues uniform, the present faces of the 6th and 10th levels should now be very close to ore, and the 10th level is now being pushed to test this. Should this level strike ore it will mean that there is a block of ground over 400 feet deep which is at present untouched, and which will be enough to keep the mill busy for some years.

During the year, operations were considerably hampered by lack of water power, due to the unusually dry season. Through the winter months the company carried on operations by steam power. Although this increased the cost of working 20 %, it was done in order to keep a force of men available to take advantage of the cheaper conditions of working which will come with the spring and consequent abundance of water.

The mine was operated with about half a crew throughout the year and furnished employment for 90 men.

Wilcox. This property was operated continuously during the year by the Broken Hill Mining & Development Company. The company's fiscal year ends in July, and during the nine months constituting the operating portion of the company's first year, 2,400 tons of ore were milled, giving a gross recovery of $38,260. Development was advanced on all levels with satisfactory results, and the production for the first six months of the current fiscal year will be fully up to the best results for a similar period in the previous year. The improvements made during the year consist of an additional tramway to connect the No. 3 level with the mill, and the doubling of the company's milling capacity by the addition of ten stamps from the mill removed from the *Golden Wedge* property in the Slocan District.

Foghorn. The Golden Monarch Mining & Milling Co. carried on development during the year with a small crew. The system of development was by means of a long cross-cut, which, as originally outlined, called for the driving of 900 feet. This was advanced all told 1,400 feet without encountering any high-grade ore, and work upon it was abandoned. During the latter portion of the year, surface work disclosed the existence of a body of high-grade ore, lying between what had previously been considered the outcrop of the main vein and the mouth of the long tunnel. An endeavour to locate this body of ore from the long tunnel was successful, a drift being advanced to meet it at a point 600 feet in from the portal of the tunnel. In this drift the owners of the property claim to have 9 feet of shipping galena. The long tunnel also passes through a large body of low-grade galena. This has a width of 46 feet, and samples of the ore give indicated values of $6. Mill tests are being made with the ore exposed, and a concentrator is likely to be erected during the coming summer.

Dundee. This mine was operated for a few months during the year by lessees, who extracted two cars of ore averaging $30 to the ton. A new company has been formed out of the wreck of the old Dundee Company. It is announced, with the greatest assurance, that work will be resumed during the coming summer, when the driving of a long tunnel to tap the bottom of the 265-foot shaft will be undertaken.

Yankee Girl. Development was pushed on this property during the year by the owners, Messss. Grobe, Lovell, McLeod and Graham. The development consists of a shaft down 37 feet, which has been sunk on a body of high-grade ore. To tap this ore a tunnel has been started. This has been advanced 240 feet, and some good ore has been encountered, from which small shipments are being made. Work was discontinued in the shaft owing to excess of water, but an upraise is being made from the tunnel level 33 feet below. When work was stopped in the shaft, there was showing in the bottom three feet of ore, assaying $40, in addition to a considerable body of ore which it is estimated would mill about $12.

Atlin.

On this property the owners completed a cross-cut for 250 feet and put a raise up to connect with the shaft, giving a total depth of 165 feet. The showing consists of a strong vein of milling ore in which small stringers of high-grade ore occur, and from which small shipments are being made. It is announced that the company will move to the *Atlin* the small experimental stamp-mill erected to treat the *Gold Cup* ore.

Hunter V.

This mine was operated throughout the year by the B. C. Standard Mining Company. The ore deposits occur in what is locally classified as limestone, and consist of gray copper and galena, with native silver frequently showing. The values in the ore are uniformly low, save when they are influenced by excess of silver; but as the property admits of working by glory holes, and exceptionally advantageous smelting rates are secured from the smelters of the Province and that at Northport, a satisfactory showing has been made by the company on the first year's operations, and, with an increased demand for the ore, and cheaper methods of mining, even better results are to be anticipated. The mine is connected with the Nelson and Fort Sheppard Railway by means of an aerial tramway 13,000 feet long, with auxiliary trams, which were completed during the year, to the mine openings. The shipments during the year amounted to 17,168 tons. The grade of this ore was lower than that of the 400 tons which made up the trial shipments from the property, but there were compensating advantages, in the way of excess of lime and lower percentages of silica. In addition to the market available during the year, the company will have the Marysville smelter to ship to during the coming year. The mine has furnished employment for a crew of 20 men during the year.

Second Relief.

This property was operated during the high-water stage by the owners, Messrs. Finch & Campbell, during which period 3,081 tons of ore were mined and milled, yielding some $12,000 in bullion and 207 tons of concentrates, the return on which was $11,000. While in operation, the mine furnished employment for 20 men. A new company is being organised to take over and operate the property, and it is expected that the spring will see the new owners in control. There is a great deal of ground blocked out in the mine, in which three levels have been run, and the promoters express their intention of operating continuously throughout the year. The difficulty in the past has been that the mine has been saddled with an air compressor far in excess of its requirements, and for a considerable period the water supply has been insufficient to operate both the compressor and the mill, though there is always sufficient water to operate either the one or other. As the ore reserves are sufficient to keep the mill going for a considerable period, the promoters of the new company announce their intention of carrying on development during the high stage of water, and keeping the mill running throughout the year.

The *Ida D.* mine adjoins the *Second Relief*, and is owned jointly by Messrs. Finch & Campbell and J. E. Read. The owners have been unable to reach an agreement for working, and nothing in the way of extensive developement has been accomplished. During the last few weeks of the year, a couple of men took out 30 tons of high-grade ore, upon which smelter returns of $1,857 were received.

Arlington.

Continuous work was carried on on this property during the year by the Hastings (B.C.) Exploration Syndicate, considerable new ground being opened up. The vein in this property is unduly flat, and necessitates the handling of a great deal of waste, but the ore is rich enough to stand it, and the year's operations show a good profit on the tonnage handled. Shipments for the year were slightly in excess of 1,000 tons, upon which the net smelter returns were $49,059, the ore values being in gold, silver and lead. The company's fiscal year ends May 31st, and the statement issued shows a shipment for that period of 1,068 tons, the net smelter returns upon which were $47,360. The total cost of mining and teaming of ore to Erie was $32,694.03, leaving a gross profit over mine cost of $14,666.

Although it has been frequently stated that the *Arlington* mine was worked out, the results of the past year's work have completely disproved this, and the mine is claimed to be in a much better position with respect to ore reserves and prospects than at any former stage in its development. During the year employment was furnished for a crew of 30 men.

The *Canadian King* mine was worked under lease by William Connolly for a period of nine months during the year. The working crew was restricted to two or three men, and of the ore extracted about 33 tons were shipped to the Hall Mines smelter, the gross value of which was in the neighbourhood of $50 per ton. The lessee is said to have two more cars of ore ready for shipment. Water hampers work on the property.

The *Keystone* mine was worked during the year by lessees, who shipped three cars of ore to the smelters at Nelson and Trail. The returns on the first car were disappointing, due, it is said, to lax sorting. The close of the year found the lessees with a couple of cars ready for shipment, which, it is said, will yield values approximating $50 to the ton.

Hydraulic Mining.

A number of companies hold hydraulic mining leases along the north fork of the Salmon, but of these the Erie Placer Company was the only one to undertake systematic work. Considerable money was spent in preliminary work between the months of July and October, in the course of which some very gratifying prospects of coarse gold were encountered. It is the announced intention of the company, as the result of the season's work, to install an hydraulic plant during the coming summer. A little individual placer mining was carried on along the stream, but with indifferent results.

A company, known as the American and B. C. Hydraulic Mining Co., has been formed for the purpose of taking over and operating three hydraulic leases on land near the mouth of Hall creek. Preliminary work will be undertaken in the summer, and if the tests warrant it, the necessary machinery will be installed.

Queen Mine.

Operations were carried on for nine months by William Waldie, one of the owners, under lease and bond. Considerable discouragement was met with during the earlier months of the lease, but towards the close of the year the lessee got into a good body of high-grade ore. Close upon 600 feet of work was done in advancing the several levels. In the No. 4 level the lessee has developed an ore chute for a length of 70 feet, and the face of the drift is still in ore. Where it has been opened up in the No. 4 level the vein maintains a width of over 6 feet, in some places being 9 feet wide. In this there is a small body of ore which will be shipped crude, the values ranging from $40 to $50 per ton, and the rest of the vein is expected to mill from $12 to $20 in gold per ton. Stoping on this ore was not commenced until December.

Milling was commenced in April, but the value of the mill feed was so low that a loss resulted on the earlier part of the year's operations. The striking of the rich ore early in December resulted in bringing up the mill recovery and established a satisfactory balance on the year's operations. As there are 145 feet of ground above the No. 4 level, the lessee has a good ore reserve in his 70-foot pay chute. This he estimates at 4,000 tons, sufficient to keep the mill going for six months, and from which he estimates to save in all values $15 per ton. This ore is now being stoped the full length of the chute.

For the nine months there were milled 4,846 tons, the values in the amalgam being $28,850.09. From this 187 tons of concentrates were made, the values of which were $4,410.14, making the total values recovered $33,260.23.

A crew of 20 men was worked during the year. During December, Patrick Clark, who has been intimately connected with the development of the Kootenay, secured a short-term option on the *Queen Group* for $80,000, which runs until March.

Kootenay Belle.

This property, comprising a group of several claims, was worked under lease during the latter part of the year by George D. and John Bell. They spent upwards of $4,000 in development and uncovered ore in two veins. One vein was prospected by a shaft sunk 26 feet, in which there are 4 feet of ore showing. In this there is a streak from 3 to 6 inches wide, carrying ore worth $50 in gold, and samples of the rest of the ledge give indicated gold values of $20. The second vein has been opened up by means of a 54-foot tunnel run in on a stringer of ore from 9 inches to 2 feet wide, from which high gold values were secured. From the openings made, 91 tons of ore were shipped, the returns from which more than repaid the total expenditures on development. Patrick Clark, through his agent, visited the property, and in connection with taking a bond on it for a very substantial figure bought out the Bell lease. Under the Clark bond a cross-cut was at once started to cut the two veins at depth. This, it is figured, will cut the smaller vein in 25 feet and the second vein, when in all told, 185 feet. The Bell lease runs till July, at the expiration of which a substantial payment falls due on the bond. In the meantime a crew of 20 men is being worked.

In connection with the development of the *Kootenay Belle* and the option on the *Queen*, Mr. Clark's agent has secured bonds upon a number of adjoining properties, and it is said an effort will be made to secure the *Yellowstone* property, which has been closed down for a number of years, and to work all of the claims together. The successful outcome of this venture will mean a great advance for the mining industry, and will in a measure be the outcome of the persistent work carried on at the *Queen*, under very adverse conditions, by William Waldie.

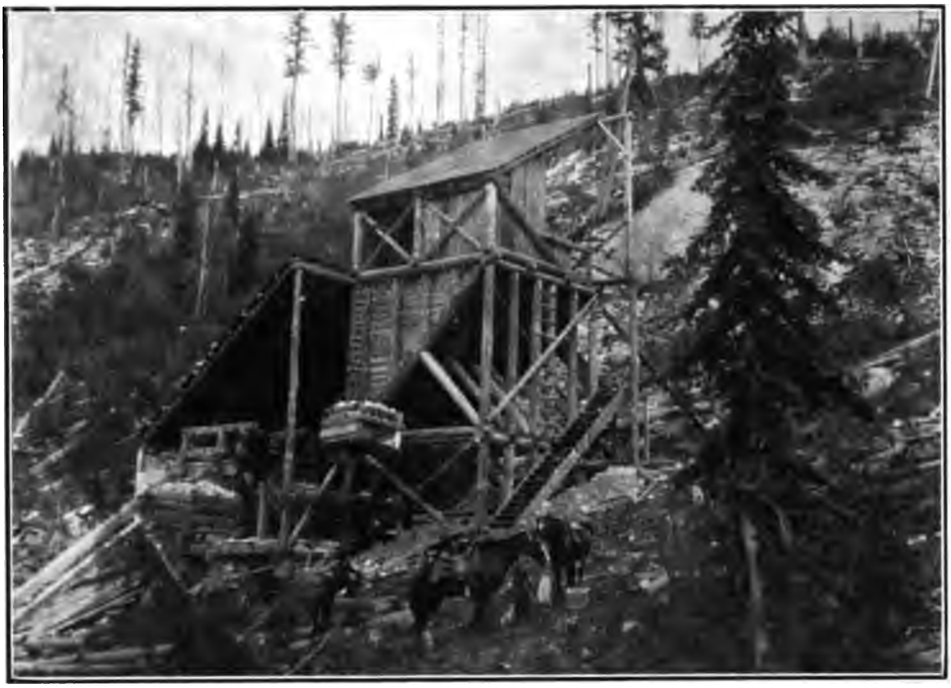
Porto Rico.

Operations on this mine were carried on throughout the year by G. H. Barnhardt, who has a three years' lease. During the year the ore extraction treated in the company's mill consisted of 300 tons, the yield from which was $4,500 in bullion, and 19 tons of concentrates, the net smelter returns on which were $540. In development the No. 4 adit was advanced 100 feet, and with another 100 feet it is expected to strike the pay chute. This will be undertaken in the spring. Throughout the winter a crew of five men was employed in stoping ore from the upper workings, and they are expected to get out a sufficient tonnage to warrant milling when the spring opens.

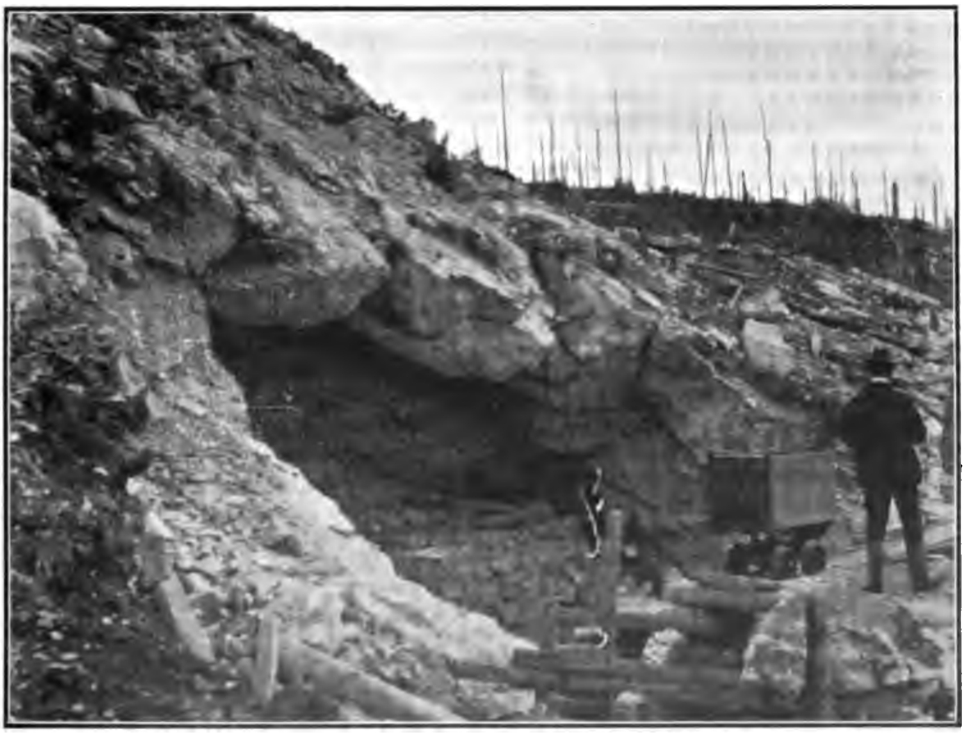
In the No. 1 level there is considerable ore yet to be taken out, the vein showing 12 inches of ore that will average $40 to the ton. In the No. 2 level there was a lens of ore that went down through the floor. This did not come into the No. 3 level, which was run 146 feet below the No. 2. Sinking on this ore has been started and a foot of ore has been developed to a point midway between the two levels. The lessee intends also to develop the veins past the fault which cut off the ore in the upper workings.

Fern Mine.

Work was carried on at the *Fern* under the Rammelmeyer lease during the early months of the year, when the ore stoped out during the previous winter was run through the mill. The result was very disappointing. The mill saving on the ore was very little in excess of $3 per ton, and not sufficient to pay tramming and milling charges. Later in the year a second lease and bond was secured on the property by Spokane men. They commenced work in December with a crew of 14 men.



UPPER TERMINAL TRAMWAY—HUNTER V. MINE.



LOWER "GLORY HOLE," HUNTER V. MINE, NELSON M. D.

Alice Mine. Work has been carried on throughout the year by the Alice Broughton Mining Company. The development accomplished consists of 700 feet of drifting, 160 feet of cross-cutting, 185 feet of raising, and 50 feet sinking. This has given 890 feet of work on No. 1 level, of which 750 feet is upon the vein, the average width of which is from 2 to 3 feet. On No. 2 level there has been about 1,000 feet of work, 540 feet of which is cross-cutting and the balance on the vein. On this level a stope has been opened up for 75 feet. In addition to these two levels there is also an intermediate, on which 230 feet of drifting has been done, and a stope opened on the south end.

During the year a concentrator, with a nominal capacity of 50 tons per day, has been erected and connected with the mine by means of a Riblet tramway 5,400 feet in length. In the milling 5 tons are worked into one, making a concentrate containing 70 % lead and about 24 oz. silver. Milling was commenced in September, but the results were not satisfactory, while working in excess of 35 % of the mill capacity. Milling operations were carried on intermittently until late in December, when the mill was allowed to freeze up, and further work was suspended. During this period 1,400 tons of ore were milled, and of the concentrates made, 113 tons were shipped to the smelters at Nelson and Trail. Exclusive of the men employed in construction, the mine and mill furnished employment for a crew of 21 men. It is said that some alterations will be made in the mill in the spring, so as to increase its capacity, as a limited mill run seriously interferes with the earning profits of the mine.

Bayonne. Work on this mine was carried on during the last six months of the year by a Butte, Montana, Syndicate, as a result of which the property was purchased at a price in the neighbourhood of $70,000. A good body of ore has been opened up, which it is believed can be milled. As the property is some 23 miles back from Kootenay lake, with a trail as its only means of communication, the treatment of the ore on the ground is essential to its profitable working. A crew of 15 men has been employed throughout the winter on development, and the results secured are deemed sufficiently important to warrant the owners of the property in expending $30,000 upon a waggon road. This must be built before a mill can be taken in to the mine.

OFFICE STATISTICS—NELSON MINING DIVISION.

Free miners' certificates (ordinary)	948
" " (companies)	18
" " (special)	3
Certificates of work	660
Money in lieu of work	1
Locations, mineral	310
" placer	20
Placer leases	7
Transfers, etc.	127
Certificates of improvement	66
Water records issued	15
Pre-emption records issued	41
Certificates of improvement	7
Certificates of purchase	40
Crown-granted claims on tax roll	733

ARROW LAKE MINING DIVISION.

REPORT OF WALTER SCOTT, MINING RECORDER.

I have the honour to submit my annual report on the Arrow Lake Mining Division for the year ending December 31st, 1904.

There has been more activity in mining, and, if all goes well, three mines ought to be shipping next year.

On the *Monarch Group*, consisting of the *Monarch*, *Empress*, *Delenger*, *Anna S.*, *Maple Leaf*, *Ontario*, and *Forest Chief*, a cabin was built upon the *Monarch* claim, and a rawhide trail completed a distance of eight miles to the lake. Four men have been doing development work upon the *Monarch*, which is showing up well, a width of 18 feet going from 35 to 45 per cent in zinc. The owners are ready to ship as soon as the Canadian Pacific railway builds a wharf at the mouth of Pingston creek. This, I understand, is going to be done shortly. A part interest in these claims changed hands for a considerable sum. There are 21 claims located upon the vein, all showing zinc. It is a great deposit of low-grade ore, with a width of 300 feet.

The owner of the *Millie Mack* claim has done considerable development work this season. A rawhide trail was built nine miles from Mineral City to the mine, and at the same time a force of men was working upon the property. There is a large quantity of ore upon the dump ready for shipping as soon as the trail gets in order for rawhiding.

The *Meadow Group* consists of the *Meadow*, *Skylark*, *Shakespeare*, *Boita* and *Davenport*. Two men have been working all summer on the *Meadow*, on which there is a good showing of ore. There is upon the dump some 80 tons of ore, which will be shipped next summer.

OFFICIAL STATISTICS—ARROW LAKE MINING DIVISION.

Number of mineral claims recorded	17
Certificates of work issued	52
Bills of sale, etc., recorded	9
Free miners' certificates issued	60

SLOCAN DISTRICT.

AINSWORTH, SLOCAN AND SLOCAN CITY MINING DIVISIONS.

Report by W. F. Robertson, Provincial Mineralogist.

The Slocan District, as the term is used with relation to mining, includes the Ainsworth, Slocan, and Slocan City Mining Divisions, each of which has its own Recording Office and Mining Recorder, while the whole district is under the jurisdiction of Mr. E. E. Chipman, as Gold Commissioner, with office at Kaslo. The Slocan District is the silver-lead district of British Columbia, and within its boundaries is mined most of our output of "silver-lead" ores, and also the "dry" silver ores, although East Kootenay produces more "lead-silver" ore than does the Slocan.

The area from which the actual production of ore is made is not as great as the geographic boundaries of the district would seem to imply, for most of the mines are towards the heads of the creeks which radiate from the central range of mountains forming the divide between Kootenay lake, Kootenay outlet and Slocan lake, so that a circle 20 miles in diameter would include most of the silver-lead mines and also most of the "dry" silver ore producers.

The geological formation of the district, speaking generally, may be said to be a belt of dark slates and allied sedimentaries, flanked and often penetrated by more recent granite upheavals, the whole being cut by numerous dykes of still later origin. The galenas occur in the slates, usually associated with igneous dykes, while the dry ores are in the granites, or in the slates near the granite contacts.

The output of the district this past year will show an increase over the preceding year, but, the district has not, as yet, recovered the high standard reached in 1897 and maintained until 1902. The condition of mining in the district is, however, better even than the increased output would imply. Formerly, all visible ore was taken out as quickly as possible, and development was largely left to take care of itself, to which system the mines lent themselves most readily, as in many cases shipping ore was encountered at "grass roots," and followed down or into the hill. The inevitable day of reckoning came, finding the mines generally short of proper development. This is only now being caught up with, and receiving the attention necessary to keep the camp up to anything like a uniform production.

Only recently has the value of the zinc blende, which accompanies much of the galena, been recognised, and serious attempts made to save it. Most of the mills have, within the past two years, been altered with a view to saving the zinc concentrates, and this is now being done; but the market for such concentrates has not as yet taken a definite standard of price, partly because there is no general standard of concentrate produced, and each mine has to seek out its own market, and further, because, speaking generally, the ore is not as yet properly prepared to meet the general requirements of the zinc ore market.

This matter is, however, receiving careful attention, now that the point is recognised, and "zinc enriching" plants for custom ores are under way on both Kootenay and Slocan lakes, while certain individual mines contemplate erecting plants of their own. Formerly, the zinc shipped with the galena, when in excess of about 10 %, was a source of "penalty" by the lead smelters, so that any reduction in this penalty, effected by the separation, must be regarded as just so much to be credited against the cost of the separation.

The zinc concentrates will average about 25 ounces of silver to the ton, and as yet no adequate price has been offered for this silver, as is evidenced by the fact that all the mills throw zinc into their galena up to the penalty limit (10 %), for which zinc they get no pay, but they do get a price for its silver contents.

There is as yet no zinc extraction plant in the Province, and such sales of ore as have been made have been for delivery in Kansas or in Europe. Ore-buyers for these points have been over-running the district this past year, and, naturally, not offering for the ore any higher prices than they were obliged to, and these have, as a rule, not been acceptable to the mine-owners, who prefer to hold the ore for the present; which policy seems to have been justified, as one of the largest producers, in a letter recently received, reports that he has recently made sales at prices 50 % in advance of what he was offered during the past summer for the same ore.

With all the mines at present operating—except the *Lucky Jim*, of Bear lake—zinc ore is strictly a bye-product, although in the *Slocan Star* the tonnage of zinc concentrates is three times that of the galena produced. Until a satisfactory market is obtained and is on a settled basis, it is impossible to do more than guess what the zinc output of the district will prove to be; for, until lately, zinc has been a thing to be avoided rather than developed.

The bounty on lead mined, given by the Dominion Government, though it has not in the Slocan proper increased the output to the extent which was hoped for, has nevertheless been of great assistance to the mines working, and has, moreover, encouraged the accomplishment of an amount of development which would otherwise probably not have been undertaken. And this is, after all, about all that could be expected, for an increase in production is impossible until the development, which fell so far behind during the years of depression, is caught up with, and this will take at least another year to accomplish.

Aside from the general development noted, the most encouraging feature of the mining in the district was the numerous small properties being worked under lease or tribute by individual miners; and while each of these units is small in itself, collectively they are important, and promise in the future to be an important factor in the output of the district, at the same time constituting a form of development bound to lead to new discoveries of ore, either on new properties or on the properties being worked. In this district some 60 mines have reported their output during the past year—a greater number than is found in any other district in the Province. In the detailed reports on the different mining divisions of the district will be found descriptions of many of the individual properties.

AINSWORTH MINING DIVISION.

Ainsworth Mining Division may properly be said to be the starting point of metalliferous mining in the Kootenays, the success of the earlier mines there stimulating prospecting, which extended over the divide into the Slocan, to Nelson and Rossland, and thence to the Boundary District. This expansion, coming so close on the heels of the first discoveries, and being synchronous with the development of the Ainsworth Division, the claims of that district in this respect are often overlooked.

The first mine to be worked in the Kootenays was the *Blue Bell*, situated on the east shore of Kootenay Lake, opposite Ainsworth, or the "Hot Springs Camp," as it was called in the early days. In those days silver was worth over a dollar an ounce, and the mine giving great promise, a smelter was erected at Pilot Bay. The *Blue Bell* contained an abundance of ore, and does yet for that matter, but the working of the deposit proved that the ore was of a lower grade than was expected, containing only from 4 to 8 ounces of silver to the ton, and this was followed by a drop of about 50 per cent in the value of silver, which closed down this property along with many others in this district.

With this, the prime importance of the camp became overshadowed by the Slocan, where ore bodies rich in silver were found almost at "grass roots," so that mining in Ainsworth languished until, in 1902, less than 5,000 tons of ore was mined, having a gross value of about $273,000, or about $55 a ton.

This was the lowest ebb in mining, as far as tonnage was concerned, for about that time concentrators came into use, rendering possible the working of low-grade deposits, and in 1903 the tonnage of the district rose to nearly 25,000 tons, having a value of $220,000, or about $9 a ton. This tonnage was produced from nine mines, of which, however, only two produced over 100 tons during the year.

The Dominion Government bounty on lead mined has had a very stimulating effect on the mines of the district, and a number of properties have, during the past two years, been developed to an extent which, although it has not as yet increased the tonnage of the district, promises to do so within the coming year.

AINSWORTH CAMP.

In the Ainsworth, or old Hot Springs camp, there was only one property, the *Highland*, doing productive mining in 1904, although the old *No. 1* mine shipped part of a car-load during the early part of the season.

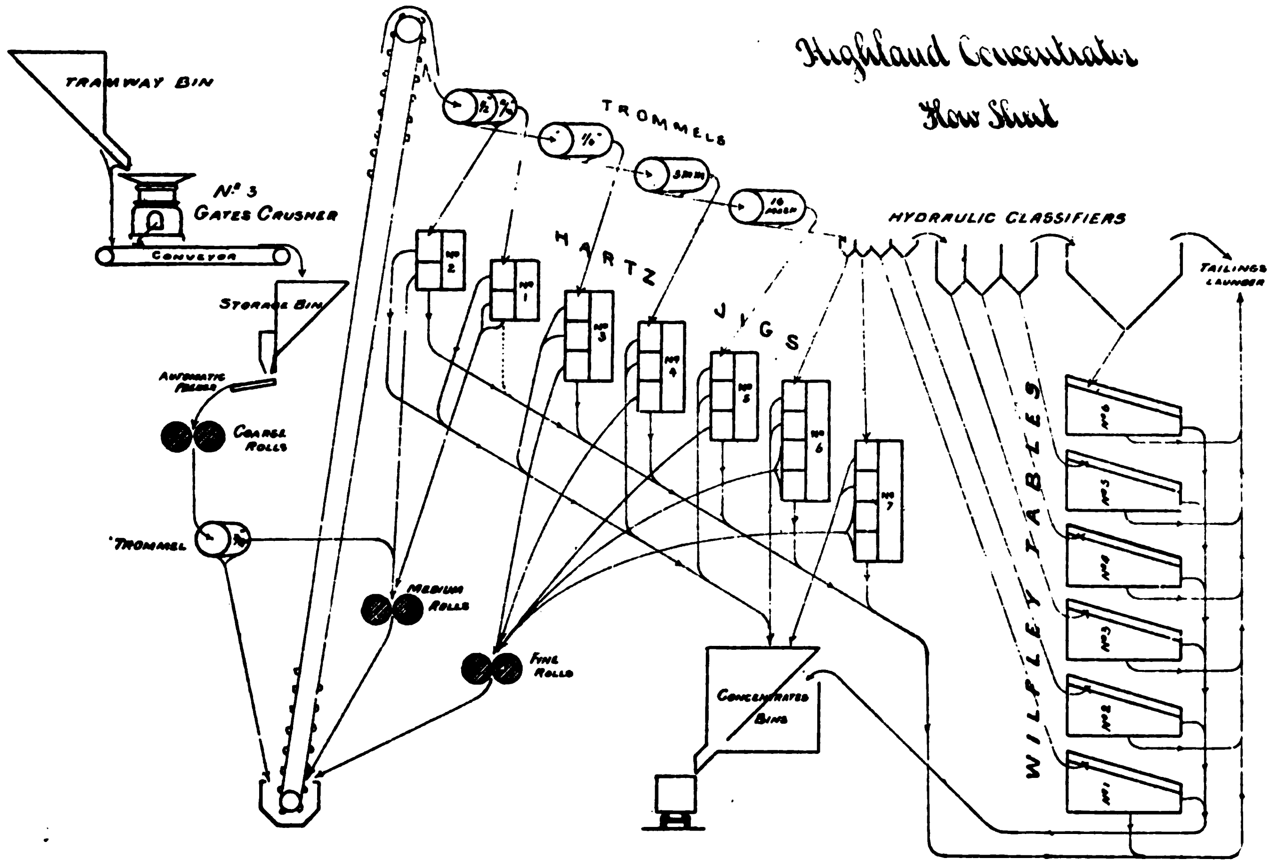
Highland Mine.

The *Highland* mine is owned by the Highland (Kootenay, B. C.) Mining Co., Ltd., of London, England, and is under the management of Mr. Norman Carmichael, of Ainsworth and Nelson. This property had the distinction, in 1903, of being the largest producer of lead in the Province, but this year it has been eclipsed by the *St. Eugene*, of East Kootenay. The mine is situated about two miles north of the town of Ainsworth, and at a distance of some 4,700 or 5,000 feet from the lake, and at an elevation of about 2,000 feet higher. The property is essentially a concentrating proposition, although a small quantity of ore is mined of a grade high enough to be shipped direct. The ore is essentially a quartz, carrying galena with low silver values, and also a small percentage of pyrite, pyrrhotite and zinc blende. The silver values are practically all carried in the galena, and no attempt is made to save any of the other minerals. The galena carries from ⅓ to ½ an ounce of silver to the per cent. of lead, the concentrates shipped running about 70 per cent. lead and from 20 to 25 ounces in silver. The ratio of concentration varies from 1 to 7 to 1 to 10, depending upon how carefully the mining is carried on.

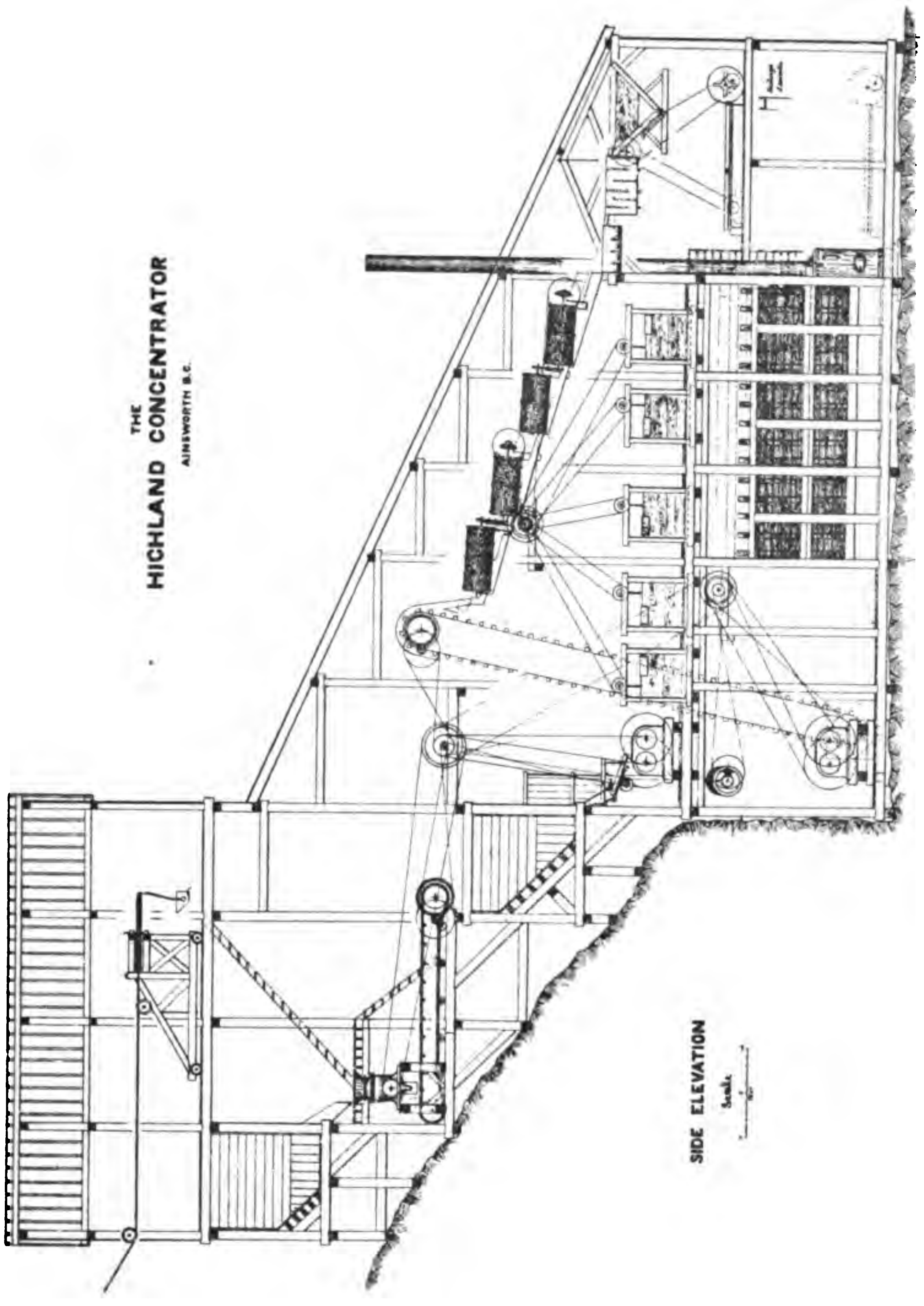
The mine has been opened up for a vertical height of from 400 to 500 feet by a series of adit tunnels and cuts, the tunnels extending into the hill for several hundred feet. The ore from all the workings is delivered by chutes to the lowest level, from which it is trammed to the upper terminal of the aerial tramway, by which it is transported to the concentrator, situated on the shore of Kootenay lake. The quartz vein is of considerable, though variable, width, cutting through a country rock of clay, shales, etc., very much contorted and probably disturbed.

As far as could be observed, the ore appears to run in chutes in the vein, not following any defined law, although the vein seems to be traceable on the surface for some distance from the present workings, cutting the formation with much apparent regularity.

The mining was being done under the contract system by A. Cortiana, at a priced based upon a ton of concentrates produced at the mill, a system which renders it very much to the



Highland Concentrator Flow Sheet


THE
HIGHLAND CONCENTRATOR
AINSWORTH B.C.
SIDE ELEVATION
Scale

interest of the contractor to send down *ore* rather than *rock* (the usual trouble with mining by contract), but, at the same time, leaves the contractor subject to the variances of the contents of the ore as work progresses.

The mining in the stopes was done by single-handed work, removing a cut of the softer hanging-wall and then shooting down the ore on the filling previously produced, which is supported, where necessary, on stulls. At the mine about forty men were employed underground, and ten above ground. There are excellent buildings at the mine for the accommodation of the men, and also a good office building.

The following is a statement of the work done in the mine during the year 1904:

Sinking and raising, done during year 1904,	426 feet.	Done up to date,	1,013 feet.
Drifting and cross-cutting „	780 „	„	3,719 „
Total for 1904,	1,206	Total to date,	4,732

The mill is situated on the shore of the lake at the lower terminal of the aerial tramway, and is provided with excellent shipping facilities, a dock reaching out to deep water in the lake and connecting with the mill by a short three-rail gravity tramway. The mill was designed and built in the latter part of 1900, by Mr. E. R. Woakes, and has a nominal capacity of 100 tons a day. It is one of the best-lighted, most roomy, and convenient mills in the Province, and is, with the rest of the plant, kept in excellent condition by the present manager, Mr. Carmichael. A sectional elevation drawing of the mill and a "Flow-sheet" are given herewith, which convey a better idea of the mill than can any worded description. These have been kindly provided by Mr. Carmichael, and were originally prepared by him for Mr. Woakes.

The plant is operated by water-power, under a head of 450 feet, a 48-inch Pelton wheel being placed on the top floor, the waste water being used for concentration purposes. As shown in the sketch, this motor drives the crushing plant, elevator, jigs and trommels, a separate Pelton, 24-inch diameter, being provided for the Wilfley tables, while a 12-inch Pelton operates an electric light dynamo. The crushing plant consists of a Gates crusher and three sets of rolls, all of the same size and pattern (Gates Iron Works), so that the parts are interchangeable. The coarse rolls run at 85 revolutions, the medium at 95 revolutions and the fine at 105 revolutions a minute. The concentrating machinery consists of two coarse or "Bull" jigs, three 3-compartment and two 4-compartment jigs, and six Wilfley tables, with hydraulic classifiers of the Lake Superior V shape, settlers, etc. The total cost of the plant complete was:—

Machinery and hardware	$16,693 35
Freight and duty on above	4,126 98
Lumber, 290,400 feet B.M.	3,590 66
Wages and salaries	11,555 07
Total	$35,965 76

The crushing capacity of the mill is such that ore for the 24 hours could be crushed on the day shift only, but the mine does not now produce sufficient ore to permit of this arrangement, so the mill was being run on one shift only, under which arrangement the cost of concentration was about 30 cents a ton of ore milled. The plant is operated by a mill foreman and three men. The percentage of extraction obtained by the mill is about 80 to 85 per cent of assay values.

The following tables, showing values recovered and costs of operation, also show the bounty earned, without which this property could not have been operated to a profit, at the present market value of lead ore:—

HIGHLAND CONCENTRATOR, AINSWORTH.

ARGENTA MINES--HAMILL CREEK, AINSWORTH M. D.

TABLE "A."

Showing Summary of Monthly Shipments for Twelve Months ending 30th September, 1904.

	Net dry tons.	Assay Value.		Prices Ag. per oz.	Net Pb. per 100 lb.	Value.		Total Value.	Freight and Treatment.*	Net Value.		Bounty Amount.	Per ton.	Total Net Value per ton.
		Silver. ozs.	Lead. %.			Silver.	Lead.			Amount.	Per ton.			
1903, Oct. —Ore and conc'ts.	276.20	30.8	73.6	55½	1.431	$4,552 96	$5,512 56	$10,065 52	$4,143 00	$5,342 50	$19 34	$3,051 17	$11 05	$30 39
" Nov. —Concentrates ..	109.33	23.0	71.7	57⅞	1.566	1,383 83	2,207 98	3,591 81	1,639 97	1,951 84	17 85	1,174 96	10 75	28 60
" Dec. — " ..	137.93	23.9	71.4	54⅝	1.66	1,709 21	2,944 91	4,654 22	2,683 18	2,508 10	18 74	1,478 37	10 72	29 46
1904, Jan. — " ..	197.16	22.3	70.3	55½	1.593	2,306 86	3,974 38	6,281 24	2,957 37	3,323 87	16 35	2,079 08	10 54	26 89
" Feb. — " ..	198.10	21.1	66.4	55½	1.529	2,208 44	3,612 10	5,820 54	2,971 45	2,849 09	14 38	1,973 83	9 96	24 34
" Mar. — " ..	271.01	23.1	70.4	59¾	1.498	3,451 05	5,146 08	8,597 73	3,990 03	4,607 70	17 00	2,862 75	10 57	27 57
" April — " ..	309.78	23.3	68.4	58½	1.525	4,019 32	5,814 07	9,833 39	4,509 09	5,324 30	17 18	3,177 07	10 25	27 43
" May — " ..	301.28	22.0	72.2	57	1.525	3,594 29	5,976 93	9,571 22	4,386 97	5,184 25	17 00	3,266 10	10 84	27 84
" June — " ..	285.10	20.3	66.8	57¾	1.566	3,155 35	5,347 35	8,502 70	4,130 24	4,372 46	15 35	2,856 15	10 00	25 35
" July — " ..	236.22	22.0	71.6	58	1.768	2,871 99	5,384 30	8,256 29	3,411 57	4,844 72	20 51	2,537 85	10 74	31 25
" Aug. —Ore and conc'ts.	286.64	23.9	66.7	59⅛	1.795	3,851 24	6,174 14	10,025 38	4,217 88	5,807 50	20 26	2,866 36	10 00	30 26
" Sept. — " ..	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Totals and averages— Ore and concentrates ...	2608.74	23.3	69.8	57½	1.593	$33,105 14	$52,094 80	$85,199 94	$38,426 53	$46,773 41	$17 93	$27,323 69	$10 47	$28 40

* $14.73 per ton.

COST OF OPERATING THE HIGHLAND CONCENTRATOR.

October, 1903, to September, 1904.

	Cost per Ton.			Tons Milled.
	Labour.	Supplies.	Total.	
Running cost	$0.2303	$0.0213	$0.2516	17,690
Repairs and renewals	.0555	.0934	.1489	
Tools	.0083	... .	.0083	
Permanent improvements	.0100	.0104	.0204	
Additions to plant	.0030	.0015	.0045	
Water power, maintenance	.0152	.0050	.0202	
Loading wharf, 〃	.0076	.0090	.0166	
Total	$0.3299	$0.1406	$0.4705	

The above cost of repairs, renewals and supplies is the total of the ex-store charges for the period, and is misleading. The following figures show the actual cost more correctly, taking the total tonnage treated by the concentrator and debiting the value of the new wearing parts at the beginning, and crediting the estimated value of the wearing parts in partially worn condition at the end of period, we have, for 39,418 tons treated, a cost per ton of $0.1425, analysed as follows:—

Crusher	$0.0195
Rolls	.0495
Trommels	.0191
Jigs	.0091
Tables	.0000
Launders	.0066
Elevators	.0096
Belting	.0074
Dynamo	.0029
General	.0188
Total	$0.1425

Highlander Mine.

The Highlander Mining & Milling Co., of Philadelphia, under the management of Henry M. Stevenson, has been operating for the past five or six years on a group of claims about two miles south of the town of Ainsworth. The group includes the *Little Donald*, *Black Diamond*, *Highlander*, *Eagle* and *Ivanhoe* claims, and extends from the shore of Kootenay lake well up to the top of the hill, about 1,300 feet above the lake, as was described by the writer in the Report of 1899. The three mentioned claims first were worked at that upper point, producing some very good galena ore carrying moderate values in silver. The veins ran more or less parallel with each other and with the lake shore, that is north and south, and dipped to the west or into the hill. To cut all these leads at a depth of about 1,000 feet below the old workings, the company started, in 1899, a long cross-cut tunnel from the *Eagle* claim about 300 feet above the lake level, which, it was calculated at the time, would have to be run 2,000 feet before it would cut the *Highlander* lead, if this lead extended down that distance. This tunnel was driven in by compressed air supplied from the Taylor air compressing plant on Coffee creek, and was 8 by 8 feet in the clear, inside of the timbers, which were of sawn lumber, 12 by 12 inches, with 2 by 12-inch sawed lagging. It was not found necessary to carry the timbering far, as the rock roof was found to be good. It must be admitted that this tunnel proposition was looked upon by mining men at that time as, to say the least, a very " venturesome undertaking."

The tunnel, however, has since been driven in over 2,600 feet and has cut the *Highlander* and two *Black Diamond* leads, and has thereby proved one point, very important not only to this property but to the whole district, namely, that the leads do go down for a considerable distance, and the workings show that they carry galena to that depth.

The property was visited in July last, and it was found that, at about 2,000 feet from the portal, a strong lead has been struck, which, from its position, is in all probability the *Highlander* lead that was developed 1,000 feet higher up. This lead is essentially a quartz vein, in which occur lenses of galena of greater or less size. From the tunnel, drifting has been done to the north and south on this lead ; to the south for a considerable distance, estimated at about 500 feet, in which length three or four ore-bodies were cut and slightly developed, which, from their appearance in the floor and roof of the tunnel, certainly give promise of considerable extent. For some reason not made public, the company has not given these ore-bodies the development which their appearance would seem to justify, and their extent is, therefore, somewhat a matter of speculation.

The main tunnel was being pushed ahead by two shifts of men, using air drills, and while, at the time the property was visited in July, no further leads had been cut, the following extract from a letter received by the Provincial Mineralogist from Mr. Stevenson tells of continued success :—

" Since you were at Ainsworth in July, and examined the *Highlander* and *Black Diamond* properties, I have cross-cut two of the veins on the *Black Diamond*, the first, at a distance of 2,520 feet from the mouth of the tunnel, being 20 feet in width, and the second, at 2,610 feet, about 6 feet in width. Both veins have first-class indications, carry values in silver, and contain some zinc and lead mineralisation. The dip of the formation changed after you were there, and is now running 26° to 28° west, instead of about 48° west, as it was in the *Highlander*. I expect to be back at Ainsworth within two months, at the latest, and shall probably start to ship from the *Highlander* then."

The company is not using its mill nor making any shipments, but it is understood that active mining operations will shortly be resumed.

No. 1 mine, which has been worked intermittently for the last few years, under the management of Mr. Leander Shaw, shipped about a carload of ore during the first part of the season. Mr. Shaw has since left the camp, and the property is now under the management of Mr. H. Giegerich, of Kaslo.

WOODBURY CREEK.

Woodbury creek flows into Kootenay lake from the west, about half way between Ainsworth and Kaslo, and is one of the important creeks of the district. On this creek are situated a large number of mineral claims, from which some exceedingly fine samples of ore have been obtained, and a number of properties which have been developed into mines of considerable promise, and from which a quantity of good ore has been shipped.

From the steamboat landing on the beach, many years ago a trail was built, which runs all the way up the creek to the glaciers at its head, but which, having been carelessly laid out and constructed, was found to be in very poor condition. This matter was, however, being rectified by the Government trail force, and what will be practically a new trail was nearing completion.

At the mouth of the creek there is a concentrator of a nominal capacity of 50 tons a day, which was built by the Canadian Pacific M. & M. Co., and which was described in the Report of 1899, but it is reported that it has stood idle since that date, the mines belonging to the company, and situated a short distance up the creek, not having proved successful.

Baltimore Group.

The only property which actually shipped any ore in 1904 was the *Baltimore Group*, which consists of six claims, the *Baltimore*, *Chance Fract.*, *Maple Leaf*, *Grafton*, *Foothill* and *Nipper*, and is owned by the English Brothers and Stott, of Kaslo. The property is situate about seven miles from the lake, on the north slope of the valley of Woodbury creek at an altitude of 6,700 feet, or, approximately, 3,000 feet above the creek bed, and is reached from the creek trail by an excessively steep and poorly built trail. About 20 tons of ore were packed out from the *Baltimore* in 1902, and in 1903 no shipments were made, while in 1904 only about 5 tons were packed down to the lake, the ore in this shipment assaying, however, about 400 ozs. silver to the ton. The development work has been done on a well-defined quartz vein, cutting through a country rock of schist and shales. The vein has a strike S. 70° W., and a dip of almost 80°.

The ore has been taken out mostly from shallow workings, within 25 feet of the surface, along the outcrop of the vein, but a shaft is down 110 feet, connecting with an adit level below, 220 feet long on the vein. From, and above, this level a raise has been started which was up 12 feet, and a stope 10 feet high by 20 feet long had been made, both in what was apparently a continuation of the pay chute of the upper workings. Along the side of the shaft stoping had been done on one side to a depth of 25 feet, and about 30 feet from the shaft, and on the other side of the shaft, to a depth from the surface of 50 feet by 30 feet wide.

The ore is essentially galena in quartz, but as the vein is much crushed and soft, much of the lead in the upper portions is in the form of carbonates. The "pay streak" in the vein is not clearly defined, but was estimated at about 6 inches wide. The workings extend along the vein for 200 or 300 feet, but the vein has been traced for a long distance on the surface by shallow cross-cuts and pits. There is little good timber in the immediate vicinity of the mine, but there is plenty in the valley below. There is a good cabin on the property, but no water.

Pontiac and Tecumseh.

The old *Pontiac* and *Tecumseh* properties, mentioned in the Report for 1899, have recently been taken over by the Nelson and Slocan Development Company, an Eastern Canadian company, and are now being developed under the local manager, Mr. C. F. Caldwell. As was then reported, some 200 tons of sorted ore had been packed out from the old workings, most of which had been mined by an English syndicate which had a bond on the property, and in taking out this ore no regard had been paid to timbering, so that three tunnels had caved in.

These claims are on the south slope of the creek valley, at an elevation of about 6,800 to 7,000 feet above sea level. There is a well-defined and persistent quartz vein traced through six or eight claims in a general S. 20° W. direction, and on the *Pontiac* claim this is cut and faulted by a strong igneous dyke, the vein being, however, found intact on both sides of it. The old levels have not been re-opened or worked, but the company is driving a lower tunnel, which should be under the ore chute found in the old workings.

In driving this tunnel, two small quartz veins were cut, containing high values. These are distinct from the main vein and have not been tested by development, other than stated, but from their appearance, and the values obtained, give much promise. There are several openings on the vein, and in several places small bodies of high-grade ore are shown up, which would pay to ship direct if there was a waggon road, but the grade is scarcely high enough to leave much margin if packed out by horses. At a rough estimate, this ore, as developed, might amount to from 500 to 1,000 tons. With these bodies of first class ore are connected, apparently, quite extensive bodies of second class ore, that is, ore mixed with quartz, too low grade to ship until concentrated, which must be done on the spot, a plan which the Company has in view, for the property is essentially a concentrating proposition, and a mill could be located in the valley bottom of the main creek and the ore taken down by aerial tramway.

Whether this plant will be built or not is understood to be dependent on what success is met with in the lower tunnel, now being driven; but from the extended development and the appearance of the exposures and dump, it would seem that the expenditure for such a plant would be justified, in which case a waggon road will first have to be built from the lake shore, unless, as it is rumoured there is a possibility of, the company operating at the head of the creek puts in an electric tram line. There were about six men working about the camp.

In close proximity to this main vein are several other veins and properties, giving much promise, but as yet having little proved by development.

Continuing to the south-west from the *Pontiac*, over a dividing ridge into the next basin, there is a string of connected claims, the *Daniel*, *Scranton*, *Mingo*, *Grand View*, *Sunrise* and *Granite*, all presumably on the same main vein.

On the *Daniel* the vein is reported as being light and containing little mineralisation other than iron sulphides.

Scranton.

On the *Scranton* a couple of men were working, the vein showing up strongly, and being well mineralised with iron pyrites and some solid galena, which showed in one place 12 inches wide for 20 feet. The selected ore is reported by Mr. Caldwell, the manager, to assay 70 % lead, 70 oz. silver, and $10 in gold, which latter is associated with the pyrites. The conditions are somewhat similar to those found on the *Pontiac*, although not nearly as much work has been done. This main vein, or a similar one, has been traced more or less connectedly throughout most of the other claims mentioned, by shallow workings or open cuts, in which some good ore was uncovered.

Some two or three miles further up the main creek, at its head, among permanent glaciers, the King Solomon mines, an American syndicate, has taken up a large number of claims, which are being surveyed and Crown-granted as fast as the requisite amount of work can be done, and for this work a number of men were employed most of the past summer. This camp was not personally inspected, as time did not permit, and the work is reported as being scattered, apparently with the requirements for Crown-granting in view before the actual development of ore-bodies is undertaken, a plan which has the merit of avoiding adverse litigation.

The claims, as surveyed, are partly on the glaciers and at an elevation which renders the working season above ground very short, which difficulty would be somewhat obviated by underground workings. The management appears to be very well satisfied with the general outlook, and some very good samples have been brought out.

On the lower portion of the creek there are a number of claims on which assessment work is being performed, and some small amount of development is being done at intervals, but no regular work was being carried on.

SOUTH FORK, KASLO CREEK.

The south fork enters Kaslo creek from the south-west about six miles from Kootenay lake, at Kaslo, that is, at Six-Mile station on the K. and S. Railway, from which point a fairly good waggon road has been built up the south fork for about six miles. On this creek a great deal of prospecting has been done, and a number of very promising properties located, several of which have previously been reported upon by the writer.

Of these older mines the *Montezuma* was probably the best known, but it has been shut down since 1900, as the amount of zinc present in the ore rendered it unprofitable. While until quite recently there has been no market for zinc ore, the increasing inquiries for this product, with the material advance in the price offered for it by the buyers, have again aroused interest in this property, and development work has again begun, and it is hoped that the *Montezuma* will become once more a shipping mine.

The *Silver Bell* property has already been described in these Reports, and some small shipments of exceedingly good ore have been made, but no active work was in progress in 1904.

Of the *Joker Group* and *Gibson* and *Palouse* claims, formerly described, and situated at the very head of the creek, little could be learned, but no active development was in progress on either, and they were not visited.

Bismark.

The *Bismark* is situated on the south side of the valley of the south fork, on Briggs creek, about 12 miles from Kaslo, and lies above the *Black Fox* claim, further up the hill, and at an altitude of about 6,500 feet. It is owned by a local syndicate, composed of N. F. Mackay, C. N. McAnn, C. Hanson and J. B. Gerrard. The property is opened up by three tunnels, the lowest of which, at an altitude of 6,360 feet, has been run in for about 480 feet on a fairly well-defined lead, somewhat crushed, but apparently continuous. No. 2 tunnel, which is about 240 feet higher up, is not connected with the lower tunnel, and is in some 170 feet, with, at 30 feet from the face, a raise extending 112 feet up to the upper level, which has been run in some 290 feet.

The ore is essentially oxides of iron, with lead carbonates and galena, in a quartz matrix, which, as shipped, will assay about 6 to 10 per cent. lead and 130 ounces in silver a ton. The occurrences of ore in the vein are somewhat irregular in size, and while the property does not give promise of any large tonnage, the indications are good for continued shipments on a small scale of such ore as mentioned, which, for its gangue, should command low treatment rates. The shipments during 1904 will amount to about 100 tons of ore, mined by two or three men. The country rocks in the vicinity are shales and sandstones, with limestone, cut by numerous dykes.

No. 2 tunnel seemed the most promising, chutes of ore showing near the mouth of the tunnel, near the first cross-cut to the left, and again in this cross-cut is a second small chute parallel with that in the level. Near the face in the main tunnel is a chute of ore, while another crosses the tunnel here, and has been followed by drifts to both right and left. The country rock at this point appears to be twisted and faulted, producing fissures, in which the mineral was deposited.

A short distance below the last-mentioned property and lying to the north-east, there is a string of adjoining claims, through which what appear to be the same veins cut, and which have been developed at several points. These claims are the *Black Fox*, *Daisy*, *Dublin*, *Cork* and *Province*. The main lead is a large interbedded quartz vein, having a strike about N. 50° E., and is on the average about 8 feet wide, although the width varies, sometimes swelling out to large dimensions.

Parallel with the main vein are four or five others which, as far as known, are of secondary importance, although they may, of course, upon development, prove to be valuable. Scattered through this quartz are a few bunches of galena which might be sorted out for shipment, but the greater amount of the mineral is so disseminated through the quartz as to require concentration. Fairly clean samples of galena were found to run from 60 to 80 ounces of silver to the ton, with gold to the extent of from $4 to $6 a ton.

On the *Daisy* claim, owned by the Black Fox Mining Co., some 1,000 lineal feet of development work has been done, disclosing some small bodies of clean ore and large bodies of concentrating ore, which, however, are not continuously connected. The property has lain idle for several years.

Cork Mine.

The *Cork* claim and two or three adjoining claims have been acquired by the Silver Star Mining Co., a French company of which Mr. P. Maris is the local representative, with office at Kaslo. This company has done extensive development work on its property, and has developed a large chute of concentrating ore, the limits of which have not been defined; but work sufficient has been done to show it to be of such a size as to justify the erection of a concentrator for its treatment. The rock formation of the vicinity is the same as that of the district generally—shales, schists and lime cut by numerous dykes—which in the vicinity of the ore-deposits seem to be close-grained, light-coloured and highly silicious, and which seem from their association to have had some direct relation to the mineralisation.

No. 1 tunnel is in about 116 feet, and cross-cuts, near its portal, an ore chute carrying galena and zinc, with some arsenical pyrites carrying gold, which chute, as the tunnel advanced, seemed to dip under at an angle of about 50 degrees, and the inner part of the tunnel is barren. A winze from the tunnel, when sunk 10 feet, recovered the ore chute, and was sunk in it for about 54 feet, or to the level of No. 2 tunnel. No. 2 tunnel was a barren cross-cut for about 118 feet, or until it struck the ore chute from the upper tunnel, on which drifting to the right and left had been done for some distance in ore of a concentrating grade.

Satisfied with the development at this level, the company started a long cross-cut tunnel from a point as low on the hillside as was consistent with leaving height sufficient for the installation of the proposed concentrator. This cross-cut tunnel is at a level about 250 feet lower than the No. 2 tunnel, and had been driven in 925 feet, cutting the ledge and ore chute, on which drifts had been set off, to the west for 213 feet, and to the east for 250 feet, from each of which drifts a raise had been started up, and had progressed in July about 50 feet, while, from later reports, one of these raises has since been connected with the upper workings. The dip of the ore chute here is greater than above, being about 70 degrees.

In the driving of this lower tunnel a vein was cut through some distance to the north of the main lead, and this is supposed to be the *Black Fox* vein, and on it a drift has been run, to the west for 17 feet, and to the east for 36 feet, which had not, however, disclosed ore in workable quantity.

The upper workings were regarded as of a prospecting nature, but this lower tunnel has been run as a working tunnel, and is a most creditable piece of work, the timbering, track-laying, drains, etc., having been laid with an accuracy and care seldom seen in the Province, and this will have a direct influence in lessening the working costs when actual extraction begins.

Near the No. 2 tunnel a comfortable bunk-house, dining hall and office, together with other buildings, had been built, but since the lower tunnel is in all new work is being centered around its outlet. Here a small but convenient building has been put up, in which is installed a 4-drill Ingersoll-Sergeant air compressor, operated by a Pelton wheel capable of generating

200 horse-power. A saw-mill had been erected, and was in operation making lumber for the mine's use, and also getting out the timbers for the concentrator building, which it was planned to erect a couple of hundred yards from the tunnel, and on the lower side of the waggon road, the latter being crossed by an elevated tram track. This concentrator had not been begun in July when the property was visited, but has since been completed, and should be in operation during the early part of 1905. The mill was designed and the plant constructed by the Allis-Chalmers Company, of Chicago, while the mill was erected by Mr. Charles Culver, for several years the mill man of the *Slocan Star* of Sandon. At the end of the year the "value of plant" is given by the management as $8,000. As an average for the year, about six men were employed at the mine under ground, and about twelve men above ground, this being in addition to the construction force employed in the latter part of the year.

Province Mine.

The *Province* mineral claims adjoin the *Cork* on the east, the development on both claims being adjacent to the dividing line, and it is certain that the ore-body in the *Province* is a continuation of that developed in the *Cork*, which has been shown to extend across the boundary for about 100 to 150 feet. The main tunnel of the *Province* is a cross-cut to the south for 173 feet, when, at a point about 220 feet east of the *Cork* side-line, it was turned off sharp to the west towards such side-line and continued as a drift in that direction for 180 feet. Here a cross-cut was made to the north for about 50 feet which cross-cut the ore-body coming in from the *Cork*, and on this a couple of small winzes have been sunk. The main tunnel had passed through the line of the ore-body without encountering it, indicating that this particular ore-body did not extend into the property for that distance.

To the east of the main tunnel, nearly in line with the ore-body, is a loose slip filled with oxidized iron material which has been followed in for 60 feet, and was found to be very loose and soft, rather indicating a water-course, but containing no commercial values as far as explored, although the writer was of the opinion that it was a continuation of the series of lenses met with in the previously described property, and gave sufficient promise to be well worth following up.

This main tunnel was below the surface at its face from 100 to 120 feet, estimated. Some 70 feet above this tunnel a small tunnel had been run into the lead and some good ore found.

As compared with the development of the *Cork* that on the *Province* is slight, but the success of the former has added much to the value and importance of the latter claim. The two properties are on the same ore-body, and it would greatly increase the economy of working both if they were worked as one mine through the *Cork* tunnel.

KASLO CREEK.

The Whitewater camp was not visited, the important properties there not having been worked by the companies owning them. The *Whitewater* was worked by leasers, who shipped about 100 tons of ore. It is currently reported that a plan for the amalgamation of the *Whitewater* and the *Whitewater Deeps* is under way, and that until this matter has been settled no great amount of work will be done on either property.

The *Jackson* mines, in Jackson basin, have not been worked this past year. The ore in this property is galena, carrying a considerable percentage of zinc, and until the market for the zinc contents can be arranged satisfactorily, Mr. Alexander, the manager, says the property will not be worked.

HAMILL CREEK.

Argenta is a townsite situated on the east side of the upper end of Kootenay lake. The present permanent inhabitants are a rancher and family, and two packers, Crawford and Anderson, who own five horses.

In 1899 the Great Northern Railway built a railroad grade from Argenta to Duncan lake. The grade follows along the shore of Kootenay lake, and up the stream connecting the two lakes, but no ties have been laid, the land along the stream being submerged by the spring floods. The road-bed is not completed and has been abandoned, but at present serves as a waggon road from Argenta to the mouths of Hamill and Glacier creeks, which enter the Duncan river above navigation. This road-bed ought to be acquired by the Government to connect the Hamill creek waggon road with Argenta, the nearest point reached by steamer, a distance of about three or four miles. Hamill creek flows in a south-westerly direction into the upper end of Kootenay lake, and is a wild stream in spring, and until August, having a grade of almost 200 feet to the mile. The first mile of its course from the mouth is in comparatively easy and open country; the next three miles is in canyon, with limestone walls, nearly perpendicular. The bed is completely occupied by the stream. The next two miles is a gorge, with a little bottom land, and this is sometimes on one side and sometimes on the other side of the creek. The sides are very steep, composed of rock bluffs and mud slides. At six miles up, the hills slope more gradually, with sufficient bottom and easy hillside to admit of a waggon road for say 15 miles further, which is as far as could be seen, but it is said that a waggon road could be built to the summit.

Trails.

The trail from Argenta rises by a gradual grade to a height of about 1,500 feet above the lake, through a narrow pass, and drops by a fair trail grade into Hamill creek, at an elevation of about 800 feet above the lake, and four miles from the mouth of the creek. The trail follows the creek up from here, the next two miles being very "up and down" and not good going, and crossing the creek twice. The rest of the way to the summit is reported as good going, the grade being fairly easy.

From the summit eastward into the Windermere district, the only possible place for a waggon road is reported to be along the present trail, which zig-zags from the summit along a steep sidehill above the glacier of Toby creek, and thence follows down the creek, meeting the Toby creek waggon road some 20 miles from Wilmer. The estimated distance from Argenta to Wilmer by trail is 80 miles, or about 2½ days by saddle horse. This trail is used somewhat by prospectors going over to the Windermere district, and it is reported that cattle have been driven over it from East to West Kootenay, but not lately.

The summit, about July 1st, 1904, was so covered with snow that Richard Gallup, who had a lumber camp six miles to the east of the summit on Toby creek, had to leave his horse and come through to Argenta on foot.

There is reported to be some good timber on the upper stretches of Hamill creek.

Mining Developments.

The only properties on Hamill creek which have received any material development are the *Lavina* or *Lavenah Group* and the *Argenta* mines. The trail to both these properties leaves Hamill creek trail at "Clinton's cabin," which is located in the creek bottom about six miles up from the mouth, and at an elevation above sea level of 2,800 feet, or say 900 feet above Kootenay lake. About one mile up this trail and 1,000 feet above Hamill creek, a short branch trail leads to the *Argenta* mines. The trail to the *Lavina Group* is about three miles long, and the mines are from 3,000 to 3,500 feet above the valley. Both trails are very steep, but good otherwise.

Lavina Group.

The *Lavina Group* was described in the 1899 Report, since when very considerable development work has been done and some galena ore shipped. The quantity was not ascertained, but was probably a couple of hundred tons, which, sorted, will run about 50 % to 60 % lead, and 60 to 70 ounces silver, and is worth, delivered at Kootenay lake, from $25 to $32 a ton. It is judged that the ore taken out has not paid for the extensive development work. There is at the mine at present on the dump about 50 tons of such ore, some of it sacked up. The property extends over the summit on to the Glacier creek slope, and development has been made on both slopes, the cabins being on the summit.

The ore-bodies are small, and are cut off by faults so as to be extremely irregular as to size, and to admit of no accurate estimate of their probable continuity. The ore, galena, is clean, with no body of concentrating ore of any size, although there is a considerable body of so-called "carbonates," which, upon assay, is found to run as high as 40 % lead and 13 oz. silver, and which ore-buyers state to be of low value according to their samples.

A rough estimate of "probable ore" of first grade would give a fair expectancy of from 500 to 1,000 tons. Of ore in sight (not on dump), there is little. Of "carbonates," there may be 2,000 to 5,000 tons, though it is doubtful if this will pay for shipment at the present price of the metals, of which there is no present prospect of a material rise.

The company is a flotation of John McKane, late of Rossland, and is at present practically dormant, no work having been done on the properties for the last two years, nor is it understood that any is contemplated. The property is suited for leasing under royalty system, but will not sustain company management.

Argenta Mines.

The *Argenta* mines were visited on Sunday, July 10th. They are situated, as stated, above Clinton's cabin, to which point an aerial tramway could be run most cheaply. The manager, Mr. Hanna, of Kaslo, had not been at the property for a month. No one was left specially in charge, except possibly the cook, whose knowledge did not extend underground; consequently, no information could be obtained from the management, and the men "did not know." There were five men at work, miners and muckers, three in No. 2 tunnel and two in No. 3 tunnel.

The "discovery" was made on a steep hillside on a quartz vein, here from 5 feet to 8 feet wide. Subsequent development has shown it to be of an average width of about 3 feet, and to dip into the hill with the bedding of slates at about 50°. This quartz vein follows a fault fissuring and crushing plane, and is very persistent, with depth, as far as traced, showing considerable regularity. This quartz has been followed and mined in all the drifts.

In this crushed zone, which is from 10 to 20 feet wide, and following the bedding, are a number of quartz stringers, which sometimes make into bunches. The walls of the zone are "slickensided" and very marked and plain. The greatest width of quartz seen was at the "discovery," which, "widening," seems to have been followed by the raise from the No. 2 drift to surface. In this thicker part of the vein the quartz carries a small amount of copper sulphide, and from the No. 1 workings there has been separated out and stored in a blind cross-cut, about 25 tons of selected ore, which the writer would estimate by the eye to average about 2 % to 4 % copper. The values are reported by the miners to be confined to the quartz vein, and to be chiefly in copper. This is all the ore that could be seen as piled up to be saved, from all the 1,300 feet of workings on the lead. In places in the drifts, small patches of copper sulphides were visible, but in no place was any large amount to be seen.

The present workings give some 375 vertical depth on the lead, which holds its size and strength for that depth, and the drifts and cross-cuts, etc., on the lead amount to about 1,300 lineal feet.

The "discovery," as noted, was on a hillside, so steep as to be almost a bluff, and on this showing of quartz some work was done and some very pretty samples of copper ore were obtained, some of the surface black gossan giving very high assay. No ore has been shipped from the property. About 25 feet vertical below this showing, No. 1 cross-cut tunnel was run in 40 feet to the ledge and 35 feet beyond it; drifting had been done to the left for 60 feet and to the right for about 250 feet.

No. 2 cross-cut tunnel is about 100 feet lower than No. 1 and is 150 feet to the lead, through shales and schists. Drifting on the lead has here been done for 120 feet to the left and about 500 feet to the right, while from the latter drift three or four small cross-cuts have been run, and a raise put up to connect with No. 1 tunnel.

The outcrop of the lead to the west cuts over a shoulder of the bluff and crops out down the side of the hill, and in this outcrop, some 250 feet below No. 2 tunnel, a tunnel was being run in on the vein. This is No. 3 tunnel, and in July last was in about 100 feet. The vein holds its own very well to this depth, although its strike was a little more to the north than was No. 2, being about N. 30° W.

It was currently reported that the management intends to drive a No. 4 tunnel and drift for which purpose an air compressor and drills are required, and for this reason the waggon road is desired.

When the mine was visited two men were at work in No. 2 tunnel and two in No. 3, and these, with the cook, made up the force on the property.

SLOCAN CITY MINING DIVISION.

The ores of the Slocan City Mining Division are chiefly dry ores—that is, they are smelting ores, containing but an unimportant percentage of lead, the values being in silver and gold; and as such ores are almost necessary to the lead smelters for the economic handling of the galena ores of the Slocan and of East Kootenay, which are chiefly lead concentrates, they command the most favorable smelting rates. The success of the district from an economic point of view is, therefore, of more than local importance, and is consequently watched with more than usual interest. The surface geology of the district may be said to be a series of repeated contacts of the granites with sedimentary rocks, which to the north form the Slocan shales, etc., and which there carry the argentiferous galenas of that section. These dry ores are not by any means so "showy" as the glittering galenas of the adjoining district, their values being determinable only by assay, and they failed to strike the eye of the old-time prospectors, who, many of them, looked upon assays as more or less "expensive luxuries," with the result that these less brilliant ores were in many cases passed by, and the possibilities of the district have not yet been developed.

From a general survey of the camp and an inspection of most of the working properties, the opinion was formed that the district would prove to be one of small, high-grade properties, calling for careful and skilful individual work, both in the mining and following up of the ore-bodies, which class of mining is particularly suited to the "tribute" or leasing system of working, since, by this system, the success of the miner is dependent on his personal care and watchfulness of minute details and indications, which are liable to be overlooked by one not at all times actually in contact with the work. It seems, therefore, that the successful development of this district will be achieved by a large number of small producers, rather than by company management on a large scale.

That there are, and will continue to be, exceptions to this rule, is unquestioned. The *Kilo* group, for example, demands a stamp mill for its economic development and working, and such is likely to be erected only by a company; but even here it is a question whether a properly run custom stamp-mill would not be of greater benefit to the camp than a mill owned and operated by any one mine.

Under the limitations statod, the demand from the smelters for "dry ores," together with reasonably good transportation facilities, makes the outlook for this camp as bright as for any in British Columbia. The tributor and leaser are only beginning to operate to any extent in the Province, and their advent is regarded with much interest, as this class of work is the best school for independent, careful miners, who depend, not on day's pay, but upon the output of ore they make; and as their success means the success of the camp, there are no conflicting interests.

The following claims visited are but a few of those in the district which give promise of successful development:—

Ottawa.

The *Ottawa* mine has this past year been one of the most successful mines in the Slocan, and the largest shipper in the Slocan City Mining Division. The shipments amounted to about 1,330 tons of ore, which netted from the smelter $120,000, and which was mined and shipped with the expenditure of $50,000, leaving an actual profit on the year's operations of $70,000. The net value of the ore at the point of shipment (Slocan City) for the year was, therefore, slightly over $90 a ton, which was practically entirely in silver, the ore running from 175 to 200 ounces to the ton in silver, with 22 per cent. lead and 20 per cent. zinc.

The group consists of the *Ottawa*, *Ottawa Fraction*, *Jennie*, *Toronto*, *Hamilton*, etc., mineral claims, situated on the north side of the valley of Springer creek, about five miles from Slocan City, with which point it is connected by a good waggon road. The mine workings are about 1,000 feet above the level of Springer creek. The original claims were acquired two years or so ago, by a Pittsburg syndicate, of which Mr. T. A. Noble is president. Since making the original purchase the syndicate has bought a number of adjoining claims, and has obtained bonds on others. The local management of the company and of the mine is in the hands of Mr. R. J. McPhee, whose office is in Slocan City.

On the *Ottawa* there are two distinct veins, developed by adit tunnels, known respectively as the Ottawa or east vein and the Noble or west vein. Both veins are strong and clearly defined, and both have a general north and south course, and a dip to the east, but neither in strike nor dip are they quite parallel, and as they are traced to the south and to the dip they appear to be approaching each other, leading to the belief that they may eventually be shown to join in that direction. The actual mining was found to be confined practically to the east vein. The west vein outcrops on the edge of and in a small cross gully subject to snowslides, which rendered it difficult to prospect. It has been cut by No. 1 tunnel and a short cross-cut and drift on the vein, at a high level, and some very good ore has been obtained, but these workings belong more properly to the prospecting days, and have been abandoned for the deeper workings, consisting of cross-cuts from No. 4 tunnel on the east vein.

Tunnels Nos. 2 and 3 are run from the side of the cross gully to the eastward and cut the east vein at levels 100 feet apart. No. 2 tunnel and drift followed the vein for several hundred feet, but pay ore was found only in one place, and then but for a short distance along the tunnel. No. 3 tunnel and drift is about 500 feet long, and in this the ore chute was found about under where it was noted in No. 2, but in this tunnel it was discovered to have lengthened to about 94 feet, while in No. 4 tunnel the same chute appears to be from 250 to 300 feet long. That is to say, the ore chute, which in No. 2 was very small, has been found to lengthen in 200 feet depth to nearly 300 feet.

The No. 4 tunnel also started from the gully to the eastward and cut the *Noble* vein, the strike of which had at this level carried it across the gully to the east side. This vein was followed some distance to the north, but proving to be barren at this point, a cross-cut was made eastward to the east vein, which was drifted on to the north, until the ore chute was cut for the distance already mentioned. Until this work was accomplished, the success of the property was problematic, and as this was finished only about a year ago, the development and equipment of the property have not yet taken definite shape. Surveys and plans were, however, being prepared for a No. 6 tunnel about 200 feet lower than No. 4, which would cross-cut to the vein in a distance estimated at about 500 feet, cutting it at a point much to the south of the present workings, so that a long drift to the north will be required to get under the known ore chute.

Pending the final decision as to the location of this tunnel, the permanent equipment of the mine has been delayed, but when completed it will include an aerial tramway to the valley of Springer creek, with probably a concentrating plant of some form, and also air compressors, etc., for which purposes surveys were being made, and a location and water rights secured, a short distance below the old *Arlington* saw-mill.

In July, the greater part of the production was being made from an intermediate level or drift between levels Nos. 3 and 4, from which stopes were being raised, with a face of about 160 feet in ore, of a width of from 1 to 3 feet of first-class ore, and of a greater thickness of second-class ore. This second-class ore will probably be concentrated eventually, but will require some process other than the ordinary hydraulic concentration, as the values are largely in gray copper, finely disseminated through a close-grained, highly silicious matrix.

The present mine plant, which is temporary in character, consists of a lumber cook-house, bunk-house, sorting shed and bins, and an office, while at the mouths of Nos. 3 and 4 tunnels are cheaply constructed timber-framing sheds and a blacksmith shop, the whole equipment, as valued by the management, being worth about $7,000. Some 48 men were last season employed underground and 13 above. The total amount of tunnelling done is about 3,500 feet, exclusive of raises, etc.

Arlington Mines, Limited.

About three miles farther up Springer creek, and on the same slope as the last-mentioned mine, are the *Arlington* and *Speculator* properties, which have in past years made large shipments of ore, but which are now closed down, and were found to be locked up and in charge of only a watchman. These properties are on a great crushed zone some 100 to 200 feet wide, filled with talcose matter. This zone has a strike of N. 10° E. and cuts from the valley of Springer creek diagonally up the hillside into the basin at the head of Ten-Mile creek, on which the *Enterprise* mine is located, and represents a very extensive fissuring and movement in the formation.

The *Arlington* has been very extensively opened up by a series of adit tunnels, A, B, C, D, E, F, G and H, and a small shaft, while, connected with these, extensive drifting operations have been carried on in the crushed zone. The filling material of this zone is reported as being fairly firm when first opened up, but the mine has stood for some time idle, and being very wet, the weather and water have acted on the filling, converting it into a talcose clay, which completely masks the formation and any ore which might otherwise be visible.

The first-class shipping ore is reported to have been found in "kidneys" of quartz carrying gray copper and silver-lead sulphides, which occur throughout the zone, but not, apparently, with sufficient frequency to permit of the mine being worked for these alone, without utilising the second class ore, of which there is a large quantity on the dumps, separated by hand-sorting from the shipping ore. For the treatment of this second-class ore the manager, Mr. J. F. Collum, has been investigating a number of processes of concentration, and is reported as having found one applicable to the conditions, which it is expected will be installed at no distant date.

The mine is elaborately equipped with all requisites, and is provided with offices and officers' quarters, assay office, ore-sorting building and bins, stables, blacksmith shops, bunk and mess-houses, etc. When shipments were being made the ore averaged about 75 ounces of silver to the ton and about 5 per cent. lead.

The *Speculator* is on the same zone, some half-mile further to the north and up the hill, and in this the conditions are practically identical with those of the *Arlington*. The *Speculator* also is lying idle. The two properties are owned by the same people.

Pioneer Mining Co.

The Pioneer Mining Company is a comparatively recently organised company, of which W. J. Wilson, of Nelson, is president, and J. W. Moffat, B. A. Sc., is managing director, and also manager of the company's mines. Although the company is new, it has acquired a number of properties which have been well-known shippers. The claims held by the company are the *Bank of England*, *Two Friends*, *Montreal*, *Black Prince Fraction*, *Slocan Prince* (*Black Prince*) and *Summerseith*, all Crown-granted, and the *Four Friends*, *Doirest*, *Dundee* and *Zip* mineral claims, in all some 380 acres. These properties are situated two or three miles in a direct line south of the *Arlington*, but over a low divide, in a basin at the head of the second north fork of Lemon creek, but are reached by a trail and sleigh road branching off the *Arlington* waggon road, near the Basin Hotel. The present company took possession of the properties only in the early part of this past season, and when the writer visited the properties in August, had scarcely had time to explore the old workings.

There are a number of strong leads on the various properties, somewhat faulted and difficult to trace out, and requiring careful and systematic work and surveying to unravel, but ore of high grade has been found in each of the openings, not in great quantity, very "bunchy" in its occurrence, but very persistent, and giving strong promise of a successful enterprise. The individual properties were formerly worked very much on the "rule of thumb" principle, but since the amalgamation, Mr. Moffat has gone in for a thorough and accurate system of mapping the leads, dykes, faults, etc., which should go far towards solving a complicated mining problem. The new work that was being undertaken was on the *Slocan Prince* (formerly the *Black Prince*) and on the adjoining *Black Prince Fraction*.

The country rock formation of the vicinity is a coarsely crystalline granite, somewhat cut by dykes, and faulted. The lead in which the ore occurs is essentially a crushed zone in the granite, possibly following along the line of one of the dykes, now obscured by the crushing and weathering. This zone is as wide as 35 feet in places, and is bounded by well-defined and fairly smooth walls, on which there is a distinct gouge clay. Infiltrations of silica through the lead matter have in many places rendered it quite solid again, and apparently with the silica came the mineral forming the ore, which is usually found in the hanging-wall side of the lead. The ore is quartz, carrying galena and zinc blende, with which is associated gray copper and other antimonial sulphides.

The grade of the ore is best indicated by shipments already made from the property by previous owners, who from 1900 to 1904 shipped about 225 tons, averaging gross value $74 a ton, or net value $64.85. The assays averaged about 132 ounces silver to the ton, 6 per cent. lead and 8.5 per cent. zinc. The present company had mined some 64 tons of ore in 1904 from below No. 1 tunnel, which averaged 177 ounces silver, 11 per cent. lead and 21 per cent. zinc. There is no appreciable amount of gold in the ore, but specimens showing native silver are found.

The underground workings here consist of No. 1 tunnel, a cross-cut 129 feet long to the lead, on which drifting to the extent of 400 feet has been done, and also sundry raises, cross-cuts, etc. About 110 feet vertically below this, No. 2 adit tunnel was driven in, and as the lead dipped into the hill at an angle of 60 degrees, this tunnel was 419 feet long when it struck the lead, or rather what was supposed to be the lead, but which, in the light of further work, may prove to be a spur from the main fissure. From this tunnel a drift has been run to the left for about 175 feet, near the face of which a raise was just being started to connect eventually with a winze on No. 1 tunnel level. Much inconvenience is caused at this point by the wetness of the mine.

To the right of the tunnel, the drift had followed the fissure for about 50 feet, when it was decided that the main fissure must lie to the north, and, consequently, a cross-cut was made in that direction, and the main fissure found in about 40 feet, along which the drift was driven for about 100 feet further to the east. From this east drift, about 40 feet from the face, a vertical raise had been put up 77 feet, and ore was struck at 47 feet up, from which point four carloads of ore were taken out last winter, indicating the possibility that No. 2 drift was under the ore. A connection from this raise to the No. 1 level was contemplated.

On the *Two Friends* the fissure is from 4 to 12 feet wide between walls, on one of which the ore occurs in a solid and well-defined body. No new work was in progress here, and the No. 2 or lower tunnel was so caved as to be unsafe to inspect. No. 1 tunnel is a cross-cut for 25 feet, from which about 280 feet of drifting had been done. As to ore taken out by previous owners, only partial returns were in possession of the present management, but these showed 215 tons of ore shipped, averaging $126.38 gross value and $99.81 net, with assays of 188.5 ounces silver, 24.6 per cent. lead, and 23.7 per cent. zinc.

On the *Bank of England* there are two defined veins, the south and the north, which have a general east and west trend, and are developed by two cross-cut adit tunnels with drifts therefrom. The work done indicates that the particular location chosen for the tunnels was very much cut by dykes and faulted. From the upper or No. 1 tunnel about 350 feet of drifting has been done, and from the lower about 750 feet. The ore is galena in quartz, carrying high silver values, with a small amount of zinc. There are good cabins and bunk-houses on the property, and a small but well-equipped assay office was in course of erection.

Following is an extract from a letter from the Manager, Mr. J. W. Moffat, giving later information with regard to the operations of the Pioneer Mining Company:—

"The ore shipped is from the *Black Prince Fraction* mineral claim. It we bought outright; we only bought a part of the *Slocan Prince*. Since you were here, we have acquired the outstanding interest in the *Two Friends*, under a bond, and have been driving a deep tunnel on the *Bank of England* east end. line, to get under the old ore chute at the west end of the *Two Friends*. We have built a first-class sleigh road from the mines to the Springer Creek road—3½ miles in all. Since you saw the mine I have blocked out at least 1,200 tons of ore that, with some sorting, we are able to ship out, with an assay value of approximately 55 to 60 ounces. Since the first of the month it has been leaving the mines at a rate of seven tons per day. To pack such ore out in the summer is impossible, owing to the cost; hence the necessity of a waggon road. Other development at the *Prince Fraction* has proved most satisfactory to us. Another nice body of ore has just been found at the west face of *No. 2 Prince Fraction*, and it, with the one already blocked out, and the certainty of reaching the old *Two Friends* ore chute in 80 days, assures us of being in 1905 one of the largest producers in the southern Slocan country."

From the Basin hotel, on the *Arlington* waggon road, the *Howard Fraction* trail leads over a pass into the first north fork of Lemon creek. On the range between these two creeks there are a number of small properties from which some very high assays have been obtained, but most of which have, as yet, received only scant development, usually by individual miners. As a rule, the leads are small, and although well defined, are much faulted.

The *Howard Fraction* is situated on the summit of the range, and formerly shipped some high-grade ore, of which the values were largely in gold, but the property has lain idle for some time.

The *Meteor*, also a former shipper but now idle, is at an elevation of 7,000 feet, and is upon a small fissure, faulted both ways, and the vein was apparently not found by the lower tunnel. Assays of ore ran as high as 512 ounces of silver and $20 in gold to the ton.

On the *Tailholt*, owned by — Ferguson, there is a flat quartz vein from 1 to 3 feet thick, dipping at an angle of 20° into the hill, the outcrop of which follows, for a number of claims, almost horizontally, along the hillside to the south, and which in the various openings is reported to give very good values in gold. On this claim a tunnel had been run in level for a short distance, with a short cross-cut therefrom, while some 20 feet lower an inclined slope had followed the vein down for some 70 feet.

The *Duplex*, *Alberta*, and six or eight other properties, are located along the hillside, on what is supposed to be the same vein.

Following down the first north fork of Lemon creek, a number of quartz veins of considerable size and permanence were found, which contained iron sulphides carrying gold values, and while few of these contained ore sufficiently concentrated in form to permit of shipment direct, there is a very large tonnage of quartz which would appear to offer excellent concentrating propositions, in which some free gold would be caught on plates, and concentrates made of a grade which would stand the costs of waggon transportation and leave a good profit.

Legal.

The first of these properties visited was the *Legal*, on which are one or more well-defined quartz veins from 1 to 3 feet thick, exposed by numerous open cuts and a couple of tunnels with drifts therefrom, amounting in all to about 300 feet of underground workings, which show the vein to be strong, but much faulted and bent. The quartz is white, scattered through with bunches of iron sulphides carrying gold, which it was roughly estimated would concentrate about 40 to 1.

Kilo.

Following down the right side of the north fork for about a mile to Violet creek, a small tributary from the north, the trail came to the *Kilo Group* of some 26 claims, which Mr. N. F. McNaught, of Silverton, has consolidated into one holding for development purposes, under the name of the "Slocan-Kilo Co.," with the expectation of erecting a stamp-mill to work the more developed properties and to assist in the development of the others, in which the values are scarcely as yet determined. These claims are the *Violet*, *Kilo*, *Superior*, *Skylark*, *Ranger*, *Bassett*, *Wedge*, *Ruther Fraction*, *Superior Fraction*, *Skylark Fraction*, *Woodland*, *Central Fraction*, *Ruther*, *Saddlerock*, *Copper Jacket*, *Susan Fraction*, *Valley*, *Gold Crown*, *Spring Valley*, *Susan G.*, *Susan S.*, *Kilo No. 2*, *Defender*, *Vigilant*, *Columbia* and *Shamrock*.

The most important of the recent work has been carried on near Violet creek on the *Kilo*, *Violet* and *Superior* claims, where a strong, well-defined quartz vein, from 18 inches to 4 feet —average about 2 feet—in width, occurs in a granite formation, having a general N. 25° E. course, and a dip of 30°. This vein has been cut by Violet creek, and in this cutting some very high grade ore has been taken out from pits and from the bed of the creek. The lead, continuing to the east, disappears under the very heavy wash which fills the valley of the creek.

To the south-west, the lead has been traced up the hillside for a long distance, and developed by extensive tunnelling. Of these tunnels, No. 1 is almost at creek level, and is in 240 feet, with a raise up 100 feet to No. 2 tunnel, which is in 160 feet, with a 50-foot raise

ARLINGTON-SPECULATOR MINES, SLOCAN CITY M. D.

ENTERPRISE MINE, 10-MILE CREEK, SLOCAN CITY M. D.

from near the face connecting with No. 3 tunnel, which has been run in on the lead for 400 feet, with two short blind raises put up from the same. No. 4 tunnel is about 75 feet above No. 3, and is in about 300 feet on the vein with a raise to the surface. Still further up the hill than the head of the raise from No. 4 tunnel is an inclined shaft, down 120 feet.

In all of these extensive workings the quartz of the vein remains strong and regular, is white, and carries a little sulphides. Of workable ore there appear to be two chutes, the first in tunnels 1 and 2 and extending up to No. 3 near its portal, while the second is developed by the shaft and is touched, but not cut through, by No. 4 tunnel.

The average value of such a vein, or of even the ore chutes, can be satisfactorily determined only by actual test in a stamp-mill, as sampling is very unsatisfactory and misleading, while the eye gives no indication as to values contained in a large quartz vein. To these facts the manager, Mr. McNaught, is keenly alive; hence his anxiety to install even a small mill at the earliest opportunity.

That such a mill is amply justified is shown by returns on a test lot of ore sent as a trial run to the *Chapleau* mill, a few miles down the creek, and which Mr. McNaught reports to have given mill returns of $20.50 a ton. Shipments made by previous owners of 35 tons of ore are reported as giving gross returns of $70 a ton, while the present owners shipped some 80 tons, ranging from $72 to $126 a ton. A shipment of 20 tons to the Hall smelter, in the latter part of 1904, ran $84 in gold and 5 ounces in silver to the ton. The sulphides carried by the quartz are chiefly iron pyrites, with a little galena and zinc blende, and these sulphides carry most of the values, although occasional samples show free gold. One specimen seen was a cube of galena with a good-sized crystal of gold imbedded in it.

A waggon road has been built some distance along Lemon creek, and can easily be continued up these properties, which lie only a short distance above the creek valley on a gently sloping hillside, and are abundantly supplied with timber and water for power purposes.

Chapleau.

The *Chapleau* mine, comprising one full claim and a fraction, is situated on a small gulch entering into the first north fork of Lemon creek from the west, and almost adjoining on the south the *Kilo Group* properties. The mine is at an altitude of about 5,800 feet above the sea level, or approximately 2,500 feet above the level of the valley of Lemon creek. By trail over the *Skylark* and *Ranger* summit, the property is about seven miles from Slocan City, from which point, however, there is a waggon road running up Lemon creek, a distance of 15 miles, to the bottom of *Chapleau* gulch. The property was staked in 1896 by Tattersall and Robertson, and later re-staked by Gwillim and Dick.

After the shipment of some two carloads of sorted ore, which gave very good results, the property was bonded in 1896 to the Hall Exploration Company for, it is reported, $60,000, under which company development was carried on for the winter; but, losing the vein at a fault, this company threw up the bond, and the owners taking hold of the property again found the vein and two more cars of ore were shipped, after which the property was sold to the present owners, the Chapleau Mining Company, for, it is reported, $35,000. This company extensively developed the mine, built a stamp-mill on Lemon creek, and connected the mine and mill by a Hallidie tramway.

The development has taken place on a quartz vein cutting a granite formation in a general easterly and westerly direction, and dipping to the north at an angle of about 20°. The vein varies in thickness from a few inches up to about 4 feet, but was estimated to be from 20 to 24 inches wide on the average. The vein appears to be accompanied by a light-coloured acid dyke, and is very much faulted, a principal fault occurring in the lower tunnel at about 250 feet from the portal, there throwing the vein 30 feet; this same fault appears also in the upper workings. The vein quartz is a dull white, in many places devoid of mineral, while in other parts it is heavily mineralised with iron pyrites, carrying gold, which occur in stringers and bunches, often of considerable size, throughout the vein. There is also a little galena and zinc-blende present in the lead, but the values are practically confined to the iron sulphides.

The mine has been opened np by three adit tunnels for about 400 feet along the vein and 200 feet on its dip. Very little timbering has been required and the workings are in a fair state of repair, but the mine buildings have been allowed to go to ruin.

Mill.

The stamp-mill is situated in the valley of the main north fork and at the upper end of the Lemon creek waggon road. The mill contains ten stamps—Fraser and Chalmers pattern—two Frue vanners and one Wilfley table, operated by a 50 horse-power Pelton water-wheel under a head of about 100 feet, the water being obtained from the fork some distance above. There is also a small electric light dynamo run by a separate Pelton. The mill was run for two months and crushed about 500 tons of ore, and is reported to have saved about 55 per cent. of assay values, about half of which was in free gold. About a year ago the mill was run on a test lot of ore from the *Kilo*, but has since been idle and in the charge of only a caretaker. The tramway is about 3,000 feet long, and is of the Hallidie type, and at present is out of repair, some of the towers being down.

Club Mineral Claim.

The *Club* mineral claim is a property on the head of Robertson creek, a tributary of Springer Creek, and is just being opened up by N. F. McNaught and associates. From this claim have been packed out this year, as a trial lot, about 5 tons of ore, which yielded about $10 in gold and 50 ounces in silver to the ton. The property is reached by a short but very rough trail, opening off the *Republic* waggon road about four or five miles out from Slocan City.

There are apparently two distinct veins on the property, nearly at right angles in their strike. The first of these shows about 36 inches of quartz occurring in a crushed zone from 5 to 7 feet wide, in which is included much crushed country rock, which appeared to be a light-coloured eruptive rock somewhat allied to granite. This vein and fissure have a strike S. W. and N. E., and a dip to the N. W. of about 30°. On the outcrop of this, an open cut some 30 to 50 feet long exposes the vein, and from this an inclined shaft has been run down for 20 feet, which, when visited, was filled with water. The slope was timbered in a crude way, and the side-rock so broken as to obscure its characteristics. From these workings some phenomenally rich specimens have been obtained, but it is safe to say the average of the face will run about from $7 to $10 in gold and 15 ounces silver to the ton. Across a small creek from the workings just mentioned, there is a second large outcropping of quartz from 6 to 8 feet wide, and apparently having a strike of N. 54° W., the dip being very uncertain. A short tunnel 15 feet long, and gaining 10 feet of depth, has been run in on this showing, and from this ore was being taken out, which, it is expected, is the 5 tons mentioned as shipped later in the season. The property is essentially an undeveloped prospect, but the results so far obtained give much encouragement for the making of a small mine.

Slocan-Republic.

The *Republic* is a property in the same locality, and formerly attracted much attention, but has of late lain idle. There is here a 2-foot white quartz vein having a strike N. E. and a general dip of 30°, occurring very much as does that on the previously mentioned property, but which seems to be step-faulted by a series of small faults about parallel with the strike. The prospectors owning the claim had put down an inclined shaft about 25 feet deep, dipping at 60°, from which some very good ore was taken out, of which small shipments were made, said to have assayed $10 in gold and 150 ounces silver. The property was then taken up by the Slocan-Republic Company, under management of R. C. Johnston, who gouged the outcrop for a length of about 75 feet and a depth of from 40 to 50 feet. It is reported that at 70 feet down another fault cut off the vein, but as the workings were partially filled with water, this could not be verified. This company started also a cross-cut tunnel from an adjoining gully, some 200 feet vertically lower, to cut the vein at that level. This tunnel had been run in for about 1,000 feet, but had not succeeded in cutting the lead when work was stopped.

Enterprise.

The *Enterprise* mine is situated at the head of Ten-Mile creek, at an elevation of about 2,700 to 3,700 feet above Slocan lake, and consists of the *Enterprise* and *Slocan Queen* Crown-granted mineral claims. The property has for some years been one of the largest shippers of ore in this camp, under the ownership and management of the Enterprise (B.C.) Mines, Ltd., of which S. S. Fowler is the engineer and local manager. About three years ago the company leased the property on a royalty basis to W. E. Koch, who has since that time operated the mine on his own account, shipping in 1903 about 900 tons of ore, and in 1904 about 775 tons, which averaged from 150 to 160 ozs. of silver to the ton, with 20 % lead and 20 % zinc. The property has been extensively opened up by a series of some seven adit tunnels driven in on the vein, of which tunnels No. 2 is in about 1,100 feet.

The vein runs in a N. 55° E. direction, with a dip of from 70° to 80°, cutting through a granite formation, which, although of rather varying width (from 0 to 24 inches), is very persistent and is traceable through both claims. The quartz gangue is enclosed in well-defined walls and carries, in chutes, galena with tetrahedrite and about an equal percentage of zinc blende, which latter mineral appears to be in increased proportion in the lower levels.

The lessee is confined to the levels of the mine above No. 2, and was obtaining most of his ore from between No. 3 and No. 4 levels, employing about 18 men underground and 8 above. The development is kept up on the levels being worked, the lessee being obliged to make proportionate advances in the levels, as he stopes the ore from above.

The property is well equipped with mine buildings, etc., and has also on Ten-Mile creek a fully equipped concentrating mill, and an air compressor, driven directly from a Pelton wheel, supplies compressed air to the mine through iron pipes. The water for power is taken out of Ten-Mile creek about a mile above the mill, and conveyed to the pressure box by flume and ditch. Beside the mill is a well-equipped laboratory, and houses for assayer and mill-men. The mill was not in operation, as no great difficulty was found in hand-sorting the first-class ore, and but a small amount of second-class ore was being mined.

SLOCAN MINING DIVISION.

The Recording Office of the Slocan Mining Division is at New Denver, on Slocan lake. The Division comprises the drainage area of all streams flowing into Slocan lake above a point half-way between Eight and Ten-Mile creeks, on the east shore of the lake, and above a point one-half mile north of Indian creek, on the west shore of the lake.

Of this area the watershed to the west of Slocan lake, which is chiefly granite and allied rocks, does not appear to have produced any productive mines, although the superficial geology is very similar to areas on the eastern side of the lake, which have well repaid prospecting, but it must be admitted that in the latter case the mineralisation has been found nearer the contact with the Slocan slates and shales.

On the slope of the hills to the east and draining westward into Slocan lake, there has been a great deal of mining going on for years, in the vicinity of Silverton, of New Denver, and on Carpenter creek and its tributaries, which latter include the vicinity of Three Forks, Sandon and Cody, the most productive portion of the famous Slocan District, wherein were discovered in the early 90's the wonderfully rich silver-lead deposits, which "paid from grass-roots," and brought British Columbia, as a "Mineral Province," so strongly before the notice of the world.

Of the famous early producers a number are still being successfully worked—as the *Slocan Star*, the *Reco*, the *Ivanhoe*, etc., with every indication of continuing to produce for some time to come, but many others, after all the visible rich ores, which were found near the surface, had been "gutted out" to pay dividends, without the devolopment necessary to permanent mining being kept up, have collapsed, their ownership has changed, and many have lain idle for the past two or three years, while little or no systematic attempt has been made to prove by development whether they are dead or only dormant. They are simply held, under Crown grants, idle.

Relief from this condition, however, appears to be at hand, in the system of leasing, which is just beginning to come into vogue in the district. The local business men, or miners who had worked in the various properties and had faith in them from knowledge so obtained, have, in several instances, secured leases to work the properties on "tribute" and under bond, which has been in some instances done successfully, revealing further ore-bodies. These discoveries will probably lead to the further development of the properties, which, as they now stand, may be said to have reverted to the rank of prospects.

As to the geological features of the Division, the shore of Slocan lake is chiefly granite, while to the east lie the Slocan slates, the contact being not far distant from the lake. Inland, the granites constantly crop out through the slates in knobs and mountain peaks, the whole being cut by igneous dykes, sometimes of great size, suggesting the thought that the slates had been "floated up" in an immense igneous upburst, and, while in evidence on the surface, and often for considerable depth, they may still be underlain by a general granite mass.

It seems permissable here to make passing mention of Slocan lake, for of the many beautiful lakes in British Columbia which it has been the writer's good fortune to see, Slocan lake is certainly the most beautiful. The lake is about 25 miles long, and two or three miles wide, flanked on the west by a rugged range of grand granite peaks, timber-clad on the lower portions, but bare and broken towards the summits, where lie glaciers, which, seen of a summer evening, glistening and flashing in the setting sun, form a picture not easily forgotten. On the eastern side of the lake the hills slope more gradually and are rounded, while along their foot-hills is some very good agricultural land.

The towns of Silverton and New Denver are on the eastern side of the lake, and for situation have few rivals in America, and aside from any future they may have from mining in the vicinity, seem destined to become summer resorts for those tourists who are not rushing through the country by the fastest trains, but who have time to take a breath of the mountain air here found in perfection.

Slocan lake is at present off the line of general travel, but can be reached at its northern end by railway from Nakusp, on Upper Arrow lake, or at its southern extremity, from Nelson *via* Slocan Junction, while on the lake a first-class steamer makes a double trip daily, connecting with the trains. The towns along the eastern shore have very fair hotel accommodation for a limited number of guests.

The writer entered the district from the south, at Silverton, proceeding later to New Denver, Three Forks and Sandon, noting the mineral development successively at these points, in which order it will be found described in the following report:—

SILVERTON AND VICINITY.

Noonday.

The *Noonday* claim is about 1½ miles south-east of Silverton, on the *Hewitt* waggon road, and is located on a small creek flowing west into Slocan lake, at an altitude of 2,800 feet. The property is held by Wilson Smith and the Bank of Montreal, and is now idle and has been for a year or so, having last been worked by leasers more intent on extracting ore in sight than in keeping up development.

The rock formation of the vicinity is slate, in which there occurs a crushed zone, having well-defined walls, between which is the crushed country rock and a vein of quartz about two feet thick, which evidently carried, in rather irregular bunches, galena and zinc blende, but in what amount could not be seen, as the property was not being worked. The vein dips at a flat angle, and No. 1 tunnel has been driven in on the lead for a total distance of about 250 feet, but with branches, bringing the lineal feet of work here done up to about double that amount. No. 2 tunnel has been driven in at 50 feet lower level, for about the same distance. A fault is apparent which dislocates the vein towards the inner part of both tunnels. Some attempts at concentrating the ore had evidently been made, as a Cornish jig, driven by water-power, was erected in the creek.

L. H. Group.

The *L. H. Group*, owned by A. R. Fingland *et al*, is situated some four or five miles south-east of Silverton, at an altitude of 5,500 feet. The property was being developed by two men most of the summer, but when visited by the writer the owners were temporarily absent, only a Swede, who knew nothing of the property or workings, being found at the cabins, so that only the tunnel mentioned was seen, the upper workings on the bluff not being heard of until later. On the top of the bluff is an exposure of quartz some 15 feet wide, running about $8 in gold, and associated with arsenical iron pyrites. At this point there were found a number of nodules of native arsenic, carrying 1,000 oz. of silver to the ton. These occurred in a calcite veinlet.

About 80 feet vertically below this exposure, a tunnel had been started in the face of the bluff, and was in about 300 feet, with a short cross-cut to the right, while at 60 feet from the face of the tunnel a cross-cut had been driven to the left for 110 feet, from which cross-cut a drift had been run for 70 feet nearly parallel to the tunnel, and was being pushed ahead. This tunnel starts in an altered shale rock, strikes a porphyry dyke, and follows a slip plane. It cannot be said that there was any vein showing, or any marked line of mineralisation, but the dyke matter contains a small percentage of arsenical iron pyrites and pyrrhotite, with quartz, which shades off into the dyke matter. The percentage of mineral showing is not great, but the manager reports the gold values as sufficiently high to permit of treatment at a profit.

Rocklands.

The *Rocklands Group* consists of the *Willard*, *Rocklands* and *Rustler Fraction* mineral claims, owned by J. C. Graves, Frank Watson and Judge Spinks, and is under the management of Mr. Hamilton, of Silverton. The group is situated about three miles due south-east of Silverton, at an altitude of 4,150 feet, on a small creek, between the forks of which, in a knoll, about 300 feet of tunnelling has been done, cross-cutting in the schistose country rock, a mineralised zone about 60 feet wide, carrying copper sulphides with gold values. On the opposite side of the small creek, the mineralised zone appears in a bluff, and is apparently of considerably greater width than the tunnel has as yet proved. Mr. Hamilton reports the zone to run about 1 % copper and $6 in gold.

These values are not high, but taken in conjunction with the extent of the mineralised zone, make the property well worth serious investigation. During August of 1904 one man was employed.

The waters leaching out of this zone, and carrying sulphates of copper, had filtered down the creek through an old log-jam, the rotten wood of which had precipitated small nodules and sheets of metallic copper, also forming oxides and carbonates. To this source, and not to the lead, must be attributed the samples of this description which were being so freely exhibited throughout the district, but not by the management.

Hewitt.

The *Hewitt Group* is about 3½ miles south-east of Silverton, and consists of the *Hewitt*, *Rincon Fraction*, *Tranquillity*, *Crow Fraction* and *Mole* mineral claims, the local agent and part owner of which is Mr. C. T. Cross, of Silverton. The company owning the property is not working it at present, but has leased a portion of the mine to Mr. M. S. Davys, of Nelson, who has kept a small force of about seven or eight men employed all summer, and has shipped this year over 400 tons of ore, running about 150 ounces of silver to the ton, 5 % lead, and 13 % zinc.

The deposit is in a contact between slate and granite, which has been opened up for a vertical distance of 830 feet, by four adit tunnels run in on the vein and two "blind" levels, Nos. 4 and 5, all connected by raises. No. 1 level is 260 feet vertically below the outcrop, and is 200 feet long with about 100 feet of raises, etc., and has been run to within 75 feet of the boundary line of the adjoining claim, the *Lorna Doone*. No. 2 tunnel is 1,090 feet long with 150 feet of raises, etc., and is 118 feet below No. 1. No. 3 is 1,590 feet long, and 104 feet below No. 2. No. 6 is 2,250 feet long, is some 350 feet below No. 3, and has been run out to the boundary mentioned. From the No. 3 level a cross-cut is driven into the hanging-wall 72 feet, at the end of which a connection is made down to the level of No. 4, where another cross-cut was made and a straight connection made with No. 6 tunnel. The levels Nos. 4 and 5 have only been started, No. 4 having been driven 60 feet and No. 5, 37 feet. From Nos. 2 and 3 levels, in addition to the contact deposit, there are a couple of north and south ore-chutes which cut into the granite foot-wall, and on these, on the No. 2 level, drifts to the extent of 100 feet have been driven, and on the No. 3 to the extent of about 405 feet.

These north and south ore-chutes are the portion of the mine which has been leased to Mr. Davys, and from which he has this year stoped out over 400 tons of first-class ore. Up to 1904, including the Davys shipments, there has been taken from the mine of sorted first-class shipping ore, 3,054 tons, and of second-class, now on dump, 3,878 tons; total, 6,932 tons. The sorted ore runs about 150 ounces silver to the ton, 4 to 5 % lead, and about 13 % zinc. The ore, as mined, will run from 30 to 40 oz. silver, 1.5 to 7 % lead, and 6 to 12 % zinc.

The ore-chute on the contact is, at the No. 2 level, about 270 feet long, or say an average of 150 feet. The ores of the upper levels were richer than those below, this being possibly due to secondary enrichment. In the lower levels comparatively little shipping ore was noted, but there is a large tonnage of second-class ore which would pay well to concentrate.

The mine is well equipped with bunk and mess-houses, and an office and quarters for the foreman. An aerial wire tramway connects the workings with the flat below, where at the lower terminal an ore-shed has been built. From this ore-shed a good waggon road connects with the dock at Silverton, and a zig-zag trail goes up to the mine, but timber and supplies are sent up on the tramway.

Galena Farm.

The *Galena Farm*, or, as it was formerly called, the *Currie Group*, consisting of five Crown-granted claims, the *Currie*, *Grover*, *Stephenson*, *Katie*, and *Peerless*, is situated 1½ miles S. E. of Silverton, and is owned by the Galena Mines Co., Ltd., of London. This property has been idle for some time and the workings were filled with water, so that nothing could be seen underground. The mine was formerly considered as having great promise, which the present surface showing would seem to justify, but if one may put any reliance on local reports, the property would seem to be another victim of over capitalisation and "across the sea" management.

There is showing on the surface, and cutting through a granite formation, a strong quartz vein, 9 feet wide, which can be distinctly traced on the surface in an east and west direction for a long distance, and which contains chutes of ore consisting of argentiferous galena, zinc blende and spathic iron. The lead dips to the north at an angle of about 50°, and it is locally reported that the workings showed, at about 150 feet down, a vertical east and west fault which cut off the vein, upthrowing it for some distance, as was afterwards shown when the vein was subsequently picked up by a cross-cut to the north. The property is essentially a concentrating proposition, and would run from 10 to 12% lead, with about 10% zinc and 15 oz. silver to the ton, making concentrates of about 60% lead and 100 oz. silver. The zinc blende would have to be separated and should, with the improving market for such mineral, prove an additional source of revenue, rather than as formerly, the reverse.

The plant is splendidly and expensively equipped with every appliance. There is a vertical 2-compartment shaft down 220 feet, equipped with hoisting plant, cage, etc., driven by a Pelton wheel under a water head of 300 feet, the water being brought from Gold creek, on which a dam is constructed, by a ditch, and a pipe-line 3,500 feet long and 30 inches at intake, reducing to 16 inches. There is also in place an old steam hoist and boiler, which are still serviceable. A separate Pelton is geared to the half of an 8-drill air compressor, formerly used for two drills and the pumps, of which there are three, a Northey, a Knowles and a Cameron. With the very complete equipment, and the really good showing, the property seems attractive for investigation, and under reasonable management should become a producer. The machinery and plant are kept in good repair by a caretaker who lives at the mine.

Wakefield.

The *Wakefield Group* includes the *Wakefield*, *Cazabazhua*, *Beaven*, *Robertson*, *Jennie Lind*, *Dalkeith*, *Kelso* and *Ben* mineral claims, situated on Four-Mile creek about two or three miles north-west of Silverton, at an altitude of 5,900 feet. The lead is a fissured zone from 15 to 20 feet wide, occurring in black slate, dipping to the south at an angle of about 20° to 25°, with a lime band on the foot-wall from 2 to 8 feet wide, which carries galena, although the ore is sometimes found also on the hanging-wall side. The property is opened up by a series of tunnels, of which No. 1 is in 700 feet, and above which the ore is pretty well stoped out, though one man was working there getting out ore. No. 2 is in about 1,100 feet and is largely stoped up to No. 1. Nos. 3, 5 and 6 are each in from 500 to 600 feet on the vein, but do not appear, as yet, to have struck pay ore.

The property has been under lease for the past two years to the Anglo-Slocan Syndicate, Ltd., of which the manager is Mr. J. T. Lane, who employed this past summer 10 miners, 10 muckers and trammers, with 2 or 3 men on tram-lines, extracting about 40 tons of ore a day, which was concentrated in the company's mill at the foot of the hill on Four-Mile creek. The ore concentrated in the ratio of 12 to 15 into 1, producing a lead concentrate running 64 % lead and 50 ounces of silver to the ton, and at the same time a zinc concentrate running about 45 % zinc and 20 ounces of silver. The present company's lease has about expired, so it is perhaps not to be wondered at that the development has been neglected and little ore blocked out ahead.

In the upper levels the ores were higher grade, carrying gray copper, but more zinc blende is coming in with depth. Of the latter mineral there is a large quantity which is not mined more than is necessary, as a market for the zinc has not been obtained, the concentrates being stored at present on the dump, the present price of $10 a ton for 45 % zinc and 20 ozs. of silver, offering no inducement to sell. The ore is taken out at No. 2 tunnel, where it is trammed 100 feet to a bin, from whence it is run in a short tram 400 feet to a second bin, which in turn discharges into a third bin; it is then loaded into the buckets of the main aerial tramway, which is 1¼ miles long, with a fall of 3,000 feet.

The concentrating mill is designed to treat 100 tons of ore a day, but when visited it was only putting through about 40 tons a day. The plant is arranged for the separation of the zinc blende, but no close separation is attempted, as the zinc concentrates carry about 20 to 20 oz. of silver, so that it is better economy to allow as much zinc as possible to go into the lead concentrates without reaching the "penalty limit" of 10 % zinc. The concentrates are hauled by waggon to Silverton, where they are shipped.

Emily Edith.

The *Emily Edith*, another of the well-known groups of claims in this district, formerly shipped considerable ore, but for the past two or three years has been shut down, and was found to be in the charge of a caretaker only, who was temporarily absent in Silverton when the property was visited, and, as all the tunnel entrances were locked up, nothing was seen of the underground workings.

The country rock is a hard brown shale, and is cut by a strong north and south fissure vein, carrying argentiferous galena and zinc blende. The mine is developod by a series of adit tunnels run in on the lead (to judge from the size of the dumps, for a considerable distance), and of these No. 4 is evidently the main or working tunnel. About 10 tons of galena ore, about 60 % lead, was still in the ore-sheds, and there were various piles of zinc blende ore, estimated at about 500 tons of 30 % zinc.

The mine is equipped with good buildings, ore-sheds, stables, office and a bunk-house well worthy of being copied by other mines in the Province, in which a well-planned attempt was made to give the men reasonable comfort and chances for cleanliness. The bunk-house is a frame building, two and a half stories high, with basement, lathed and plastered inside and clap-boarded outside, and was not an expensive building to construct. In the basement is a heating furnace for the whole building. The first floor contains changing-room, wash-room, sitting-room and writing-room for the men; with a separate entrance, office, draughting-room, and rooms for foreman and clerks. The top story is one large, well lighted and ventilated room, provided with a single row of double bunks, well built of planed lumber. This is the "ram pasture," where men are provided with a bunk and mattress without extra fee beyond the usual charge for board. The second floor is divided up into small rooms, each with a window and door, some fitted up with two beds, and others, larger, with four beds, each bed being provided with a woven-spring mattress, etc. Beds in these rooms could be had at a small additional charge, said to be 75c. a month for a bed in a four-bed room, and $1 a month in a two-bed room. These charges, though small, pay splendid interest on the additional cost of construction, and the fact that they are always in demand proves that the men did not grudge the additional charge, which ensured them some privacy and a chance to keep clear of the dirty and undesirable element which, however small in proportion, is often to be found in a mine bunk-house. This bunk-house was planned and built by the then manager, Mr. E. Rammelmeyer, and the company, of which C. E. Hope, of Vancouver, is the agent, has the plans.

It is recently reported that this property has been taken over under lease and bond by M. S. Davys, of Nelson.

Comstock.

The *Comstock* was formerly extensively worked by a company, but is now under lease to Messrs. Hunter & Davys, who are operating the property with a force of 1 foreman, 4 miners, 2 ore sorters, and a cook, who also

MOUNTAIN RANGE, SLOCAN M. D.

assists with the ore sorting. The property is situated on Fennel creek, a tributary of Fourmile creek, at an altitude of 6,400 feet, and is 13½ miles from Silverton. It includes the following mineral claims: The *Comstock*, *Blue Peter*, *Isabelle Fraction*, *Kentucky Girl*, *Ruby Fraction*, *Silver Cup* and *Silver Chief*.

The rock formation of the vicinity is granite, and at the mine appears to be cut by a porphyry dyke. Following the fissure, and seemingly in places replacing the dyke, is a quartz vein from 1 to 5 feet wide, having a strike N. 30° E., with a dip of 30° to the south, carrying, in bunches or chutes, up to 24 inches, galena and gray copper.

When the property was visited in August last, from 1¼ to 1⅓ tons of sorted ore were being mined daily, which would assay about 50 per cent. lead and 100 ounces of silver to the ton. This ore was sacked and hauled by waggon to Silverton, at a cost of $5 a ton, the team making one round trip in a day.

The mine is developed for a vertical depth of 400 feet, by a series of adit tunnels of the following lengths: No. 1, 40 feet; No. 2, 200 feet; No. 3, 360 feet; No. 4, 540 feet; No. 5, 720 feet; No. 6, 280 feet; No. 7, 160 feet; No. 8, 360 feet; No. 9, 140 feet. Stoping had taken place between levels 2 and 3 for a length of 50 feet, and between 5 and 7 for a distance of 360 feet, although not continuous. In No. 9 there is a small streak of very rich ore, running as high as 360 ounces silver to the ton.

Towards the foot of the hill and near Four-Mile creek, a concentrating plant has been erected, for which the character of the *Comstock* ore, which is easily sorted by hand and of which little is second class, does not seem to offer justification. This mill is very complete and well equipped, and was erected in 1897 at a cost of $23,000, and after running a couple of months was closed down in 1898, since when it has been unused. The ore was hauled to it by teams from the mine, a distance of 1½ miles down a heavy grade, and dumped into the mill storage bins, from which it was trammed to the mill bin. The mill was designed to crush the ore by Blake crushers, from which it was fed by automatic feed to rolls on the lower floor, from whence it passed to an elevator, and was raised to a 3-screen trommel at the top of the building. The product of the first screen went to the classifier; of the second, to a pair of fine jigs; while material from the third screen, and the oversize, went each to a pair of coarser two-compartment jigs. The products of the classifier went as follows: First product to two-compartment jig; second and third products, each to a three-compartment jig. The overflow from the classifier went to a V-shaped settler, the slimes from which were fed to two double-decked Evans revolving tables.

Fisher Maiden. The Troy Mines, a company of which C. Twitchell, of Spokane, is secretary, is operating the *Fisher Maiden Group*, as it was formerly called, under the superintendency of C. D. Long. The properly includes the *Troy* and *St. Helena* Crown-granted mineral claims, and is situated on Four-Mile creek, about 1¼ miles by trail above the point where the *Comstock* waggon road leaves Four-Mile and turns up Fennel creek. The main and original workings are some 1,000 feet back from the creek, on a small gulch near Porcupine creek, where three tunnels have been driven in. The No. 1 has 50 feet depth at the face; No. 2 is some 75 feet lower, and has 150 feet of drifting on the vein, preceded by a cross-cut tunnel 150 feet long; while No. 3 tunnel is a cross-cut from Porcupine creek valley, 200 feet long, with a drift on the vein for 350 feet, and is 100 feet lower than No. 2.

The vein has been traced over a small rise on to Four-Mile creek, where No. 4 tunnel was driven in for 275 feet on the vein, at a height of 100 feet above the creek, or at a level 230 feet lower than was No. 3 tunnel. No. 5 is from about 30 feet above the level of Four-Mile creek, and some 70 feet below No. 4. This tunnel is being continued on the vein to cut the ore chute seen in tunnels Nos. 1, 2 and 3, at a depth of 300 feet lower than No. 3, which it should do in a distance of about 1,000 feet from the portal.

The vein is a true fissure in syenitic granite, having a N. E. and S. W. strike, with a dip to the N. W of from 75° to 80°, and appears to accompany, and possibly partially replace, a porphyry dyke, the mineral occurring on either granite wall for from 4 to 12 inches thick in the ore chutes, while the vein proper is from 1 to 4 feet wide.

The company is at present confining its energies to the Four-Mile creek workings, and is operating with 4 miners and a car man, pushing the long No. 5 tunnel ahead as fast as possible, and incidentally taking out a little ore from the ore-chute between levels 4 and 5. The ore-chute above No. 1 is reported as stoped out, and while some stoping has been done above Nos. 2 and 3, there is still ore in sight. The ore-chute on No. 4 is about 110 feet long and contains a heavy percentage of zinc.

The company shipped, in 1903, some 14 cars of ore, and in 1904 5 cars, or about 100 tons, running about 90 ounces of silver to the ton, and 4 or 5 per cent. lead. The property is provided with most comfortable bunk and mess-houses and office and stables. The mine buildings are sufficient, but are temporary in character, awaiting the completion of the long tunnel.

Alpha.

The *Alpha* is a group of Crown-granted claims situated about two miles from Silverton, and some years ago shipped 1,200 tons of ore, chiefly from a large body of galena and lead carbonates found practically on the surface. For a number of years the property has lain idle, originally on account of litigation, the causes of which are said to have been adjusted, and the property is now held by N. F. McNaught, *et al.*, of Silverton.

The formation is a black slate and limestone, much disturbed and cut by faults. The original discovery was the immense pocket of ore already mentioned, which has been mostly extracted. Leading into this is a vein having a north-east and south-west strike, and a dip to the east of apparently 30° to 40°, accompanied by a light-coloured dyke. The dip has caused some trouble, as apparently the No. 1 tunnel was run under the main vein and missed it, as inclines in ore, from the main showing, later indicated. The showings of ore in the tunnels are not encouraging for this reason, but there is a very promising showing in the shallow upper workings, which might be proved and worked by cross-cuts from the present tunnels. The lead here appears to be as wide as 48 inches in places, of iron oxides and lead carbonates carrying good silver values, and locally, a stringer of 20 inches of calcite was noted on the foot-wall, carrying a secondary deposit of ore of good value.

No. 1 tunnel is about 300 feet long, with upraises, cross-cuts, etc. A secondary tunnel on the same level and started from near the portal of No. 1 was run N. 70° E. for 50 feet, and immediately below this was No. 3 tunnel. About 80 feet below this is No. 4 tunnel, a cross-cut for 100 feet through very much contorted country rock, with a drift of 110 feet on the vein but with no ore showing. No. 5 is still below No. 4, and is on a well-defined lead which did not show ore. It is very much a question whether these last tunnels are on the lead, which, in the upper workings, carries ore.

A gravity 3-rail surface tramway 1,200 feet long runs from No. 1 tunnel at a slope of about 30° down the hillside, at the bottom of which are bins and an ore-shed, from which a waggon road 2½ miles long leads to Silverton.

VICINITY OF NEW DENVER.

Mollie Hughes.

The *Mollie Hughes Group* is situated on the flank of Goat mountain, about one mile north of the town of New Denver, and on both sides of the Nakusp and Sandon branch of the C. P. Railway, at the trestle. The property is owned by T. Avison *et al*, of New Denver, and consists of five Crown-granted claims. The country rock is a syenitic granite, cut by a number of parallel and well-defined fissures, running east and west or along the flank of the mountain, in which occur quartz veins of greater or less width, carrying, in chutes, ore high in silver.

On the *Kincara* vein, just below the railway trestle, there is a quartz ledge, with an E. and W. strike and dip of 70° to the north, which is a clean, well-defined fissure vein in granite, from 4 to 12 inches wide, and on this a tunnel has been driven for about 80 feet, in which the vein appeared for about 60 feet, when it pinched down to a seam, but came in again towards the face. From here, about 12 tons of ore were shipped in the early part of 1904, which yielded 146 ounces in silver and about $4 in gold to the ton. The vein has been opened up on the surface by various open cuts, etc., for about 1,000 feet, and a cross-cut tunnel has been started to cut the vein at a depth of 70 feet. This has been driven 70 feet, and it is calculated that it will have to go another 40 feet before striking the ledge.

On the *Real Idea No. 2*, one of the group, above the railway track, almost a quarter of a mile from, and 600 feet higher than, Slocan lake, in a large open pit, a quartz vein, here from 7 to 8 feet wide, is being developed and had been proved on the surface for 400 feet. This is also in granite, with free, well-defined walls, and although no shipment had been made from this opening, about a carload of ore was ready to ship, which, from rough samples, was expected to go about 150 ounces in silver and $40 in gold to the ton.

About 75 feet above the railway track, at the first trestle, another quartz vein has been opened up with a north and south strike, on which Mr. Sandiford, of the *Bosun* mine, is reported to have sunk a shaft for 65 feet, obtaining therefrom a carload of ore, one-fourth of which is said to have assayed 556 ounces of silver and $40 in gold to the ton, while the remainder went 100 ounces silver and $10 in gold. The owners have shipped from these workings a carload in bulk, which assayed 72 ounces in silver and $10 in gold to the ton. Connecting with the bottom of this shaft is a 100-foot tunnel, which was supposed to be a cross-cut, but which, in fact, follows along a small east and west vein carrying values. From the shaft, at 40 feet from the surface, levels have been run north and south for short distances. The ore is wheeled from the lower tunnel to a bin beside the railway track, where, when enough for a carload has been accumulated, it is loaded.

From the *Mollie Hughes* eastward the face of Goat mountain is seamed with small quartz veins, on a number of which mining in a small way is being carried on. The country rock on this upper part of the mountain is granite, and the veins have a general north-east and south-west trend.

Capella.

Of these the best known is the *Capella Group*, comprising five Crown-granted mineral claims, owned by W. R. Will and N. F. McNaught, from which was taken what was probably the most valuable carload of ore ever shipped from the Kootenays. This carload of ore yielded $10,100 smelter returns, and assayed 879 ounces silver and $7.80 in gold to the ton. The property was not personally visited, as Mr. Will reported it as stoped out over the level, and he was only driving a lower cross-cut to the vein, which was not through, and so there was nothing to be seen. Mr. Will supplied the following general information:—On the south face of and near the summit of Goat mountain, at an elevation of 2,500 feet above Slocan lake, a quartz vein 5 or 6 inches wide cuts the granite in a north-east and south-west direction, dipping to the west at an angle of 35°. There are four other parallel veins on this property. The main vein is opened up by No. 1 tunnel, which is an 80-foot cross-cut to the vein, with a drift of 200 feet on the vein, above which the vein has been stoped to the surface. Below this there is No. 2 tunnel, a cross-cut of 260 feet, with a drift of 120 feet, and upraises therefrom to No. 1.

The ore-chute is about 100 feet long, and the values are chiefly on the hanging-wall side. There are several faults throwing down to the north, cut by the tunnel, and a fissured zone in the rock, 6 or 8 feet wide, cuts the lead without faulting it, near which, in the vein, the best values have been found to occur. The ore-chute mined has been found to continue to the tunnel level, being still in the bottom, and the lower tunnel is being driven to develop it at a lower level. On another and lower vein, tunnels have been run in 55 feet and 120 feet, with raises.

The shipments made to date from the property amount to from 150 to 160 tons of ore, of an average value of $100 a ton, but no shipments were made in 1904. The drifting at present going on is being done by contract.

Bosun Mine.

The *Bosun* mine, situated a short distance from Slocan lake, about half-way between New Denver and Silverton, is owned by the Bosun Mines, Limited, 5, Fenchurch Avenue, London, England, and has for the past year or two remained idle, being now in charge of a local watchman. The property was last under the management of Mr. Sandiford, who is well known in the district. The property is extensively developed by a series of five adit tunnels on the lead, for a vertical depth of 365 feet and a total length of nearly 1800 feet. The lowest, or No. 1 tunnel, is 1,000 feet long, connected by raises with No. 2, 130 feet above. No. 2 is 800 feet long, and 80 feet below No. 3, which is 1,000 feet long, and 85 feet below No. 4. No. 4 is 500 feet long, and 60 feet below No. 5, which is 300 feet long, and, at the face, 60 feet below the surface.

The lead is a large fissured zone filled with crushed material, in which occur, with quartz, lenses of galena and zinc blende. Of the interior of the mine little could be seen, as all the levels are well-timbered and lagged, and the "sloughing off" of the clay, from water and air, obscured everything.

Mowich.

The *Home Run* or *Mowich Group*, owned by C. Greenlee, Moran and Kingsbury, is situated on the south slope of Carpenter creek, about two miles from New Denver, and a short distance above the old New Denver-Kaslo waggon road. The property includes the *Home Run*, *Mowich*, *St. Clair*, *Rosemarie*, *Grand Stand* and *Ronald Fraction* claims, and is in the "slate belt." The main lead is a quartz vein, from 3 to 6 feet wide, cutting the slates, and on this there is a 100-foot tunnel, with lower down a 500-foot tunnel, from which some very good ore was taken and some small shipments made.

During the summer of 1904, work was confined to a cross-vein of quartz occurring 800 feet lower down and running with the formation, between very contorted slates, having a strike about S. 55 degrees E. and a dip to the S. W. of 80°. On this vein No. 1 tunnel was in about 300 feet, at which point there was a raise up 35 feet, while 80 feet above No. 1, was No. 2, then in 100 feet. The quartz carried, in chutes, gray copper and galena, and one carload shipped ran 114 ounces silver and $2 in gold to the ton. Part of a carload was ready in the ore-shed, and it looked probable that about two more carloads would be shipped during the year.

Mountain Chief.

The *Mountain Chief* almost adjoins the last-mentioned property, and has been idle for some time. It is owned by George Hughes ($\frac{1}{3}$) and McCune, of Spokane ($\frac{2}{3}$). The property was one of the famous mines of the district, and during 1892, 1894 and 1897 is represented to have shipped $150,000 worth of ore. There is a strong vein in limestone and slate cutting N. 20° E., and dipping about 45° to the S. W. The ore was galena with zinc blende. On one dump there is a pile of black zinc ore estimated at 50 tons, and at a lower tunnel 100 tons of similar ore is piled up. This ore is reported to carry 40 per cent. zinc and 50 ounces of silver to the ton.

Vicinity of Three Forks.

Before the Kaslo and Slocan Railway and the Rosebery branch of the Canadian Pacific Railway were constructed, the town of Three Forks, situated, as its name implies, at the junction of the three forks of Carpenter creek, was a town of considerable importance, as it was at the junction of the waggon road from New Denver to Kaslo and the branch road from Sandon, over which route, in the early days, many tons of very rich galena ore were taken out by pack-train and waggon. This traffic induced the construction of the two railways, but, as is usually the case with such intermediate stations on a waggon road, the advent of a through railway practically killed the town, and to-day it is deserted, save by a few people having local interests which still keep them there.

There were formerly in the vicinity three or four mines of importance, which have been passing through a period of inactivity, from which they are only now recovering; in addition to which, the recent development of a number of small rich "dry ore" properties again gives promise of renewed mining activity in the vicinity, and of a renewed vitality to the old town, which, even now, can boast of two hotels and a store. The town is a station on the Canadian Pacific Railway branch, and is the railway headquarters for the upper end of the branch, as the grade from here up to Sandon is so steep that trains have to be split up and taken on in sections.

Monitor Mine.

The *Monitor* mine, including the *Monitor* and *Hustler Fraction*, is owned by the Monitor and the Ajax Fraction, Ltd., of 42 and 44, Effingham House, Arundel Street, London, and is under the local management of Mr. Maurice Gintzburger, with Mr. Fingland as mine superintendent. The mine is now idle, pending the installation of machinery at the mine, and the construction, near Rosebery, of a plant for the separation and recovery of the zinc blende, which occurs with the galena to such an extent as to have been a cause of penalty at the smelter. Its removal from the galena will permit that ore to be treated at a lower figure, while the zinc, if properly prepared for market, will have a distinct value of its own. Formerly the mine shipped extensively, the total shipments amounting to 3,185 tons of ore, which netted $192,401, of which there was shipped prior to 1901 (when the present company took possession), 688 tons, valued at $68,869.60, the present company having shipped 2,497 tons, valued at $125,531. The property is situated on the south slope of the south fork of Carpenter creek, opposite the town of Three Forks.

The country rock is slate, and is cut by a well-defined quartz vein having a general N. 10° E. strike, and a dip to the S. E. of from 60° to 90°, cutting the bedding of the slates nearly at right angles. The vein varies in width, but is as great as 48 inches, and carries galena and carbonates, with silver values and a certain amount of gold, also, in parts, a considerable percentage of zinc blende. The property is developed by five adit tunnels, of which the upper, or No. 1, is 450 feet long, and in its course cuts one fault with a throw of 40 feet, beyond which the vein has been again picked up.

No. 2 tunnel, 78 feet lower and 650 feet long, has about 200 feet of additional exploratory workings off it, and cuts through two faults, the first, near the portal, with a throw of 32 feet to the right, the second being that noted in No. 1. The work has been pushed through both these faults, but was finally stopped at another fault, which dips into the hill with the bedding at an angle of 60°.

No. 3 tunnel is 50 feet below No. 2, and meets at the portal a fault with a throw to the right of 20 feet, and also cuts through the 32-foot fault coming down from the level above. This tunnel likewise is stopped at 850 feet in, by the same fault which blocks No. 2.

No. 4 tunnel is 122 feet below No. 3, and is 1,080 feet long, and cuts the same two faults as does No. 3, but has not, as yet, been driven out to the main fault.

No. 5 tunnel is 217 feet lower than No. 4, and is a cross-cut for 400 feet with 120 feet of drifting on the lead, in which is encountered a new fault not previously met with. It is estimated that this level would have to be extended 1,000 feet before it struck the line of the main fault. There has been good ore in the upper levels, which, although pretty well mined to these levels, is still continuing into the floor, so that the long tunnel is expected to cut these ore-chutes with depth. Besides this, No. 5 cuts a new ore-chute, on which some stoping has been done and an intermediate level started.

Rowse Fraction.

The *McAllister Group* consists of four claims, including the *Rowse Fraction*, situated about six miles from Three Forks, up the north fork, and is being operated by Hunter, Fairbairn, *et al.* The country rock here is a schist on the foot-wall, and an argillite on the hanging-wall, of a well-defined quartz vein with a strike N. E. and S. W. and a dip of 50° to the S. E., or into the hill. The quartz vein, from 3 to 4 feet wide, was followed down for about 30 feet, when it was completely cut off by a fault. A cross-cut tunnel, started 30 feet lower down, passed under the line of the upper workings without encountering any vein, but at 150 feet in, the vein was again picked up and drifted on for 20 feet. The tunnel cuts in its course a second small vein, on which a short drift had been run, but with no great results. A short distance above the vein there is a large porphyry dyke about parallel with it. The vein quartz carries galena, with gray copper and silver sulphides, the ore, as shipped, running over 250 ounces in silver to the ton. About 300 feet to the S. W. of the workings just mentioned, and some 150 feet higher up the hill, an open cut and tunnel developes a second vein of quartz, which gives much promise, but had been little developed.

Jo-Jo.

The *Jo-Jo* is situated about a mile to the north of the last-mentioned claim, and is of about the same character. The property has been worked during the past season by two leasers, who have shipped about 25 tons of ore, running 150 ounces in silver. During the summer some samples of ore were met with in the workings which gave phenomenally high assays.

Messrs. Cory and Foster operated the *Cinderella*, in the same neighbourhood, under lease, and shipped between 175 and 200 tons of ore during the year. The property is owned in England.

Idaho-Alamo.

The old *Alamo* and *Idaho* mines, which formerly were among the largest producers in the Slocan district, have been amalgamated under one company, the Idaho-Alamo Consolidated Mines, Ltd., an English company, of which Mr. P. D. Ahier is superintendent and engineer. The properties are situated on Howson creek, which enters Carpenter creek about a mile below Three Forks. At the head of this creek, near the summit, are two short branch streams ending in semi-circular basins surrounded by steep bluffs, through which the leads cut, and from which point they have been worked. The rock formation of the vicinity is slate, cut by porphyritic dykes, much contorted and bent, and in places faulted, although in the properties under review no important faults were noted.

The *Alamo* vein was formerly worked from the *Alamo* basin, from which a cross-cut has been driven through into the *Idaho* basin. The claim has been developed for a vertical depth of 288 feet, by four levels driven in for from 1,000 to 1,200 feet, and systematically laid out with raises, etc. Above these levels the known ore has been pretty well extracted. There was, however, good ore in the floor of the bottom level, and in a winze, so there is reason to believe that it continues downwards, and it is reported that a tunnel will be driven this winter to prove this. The vein is from 3 to 8 feet wide, a fissure in slate, with a dip varying from 45° to 90°. The last shipment was made in 1898, when 400 tons of ore were shipped, running 40 % lead and 180 oz. silver to the ton.

A Riblet aerial tramway, 6,000 feet long, with a rise of 3,000 feet, runs from the mill on the railway up Howson creek to the junction of the *Alamo* and *Idaho* basins, and can be produced in a straight line to the *Alamo* workings, if desired. In the meantime a "baby tram," 1,800 feet long, runs from the upper terminal of the main tram to the *Idaho* workings, and over this all the *Idaho* ore is transported.

During last summer, all the work was confined to the *Idaho* basin, and while a little underground work was in progress, most of the work was being done on the outcrops, and on the surface of the claims in the basin, from 25 to 30 men being employed. The property is opened up by a series of adit tunnels, not all of which are connected.

There was exposed on the surface of the lead a large body of ore which was being quarried, while in the basin above the claim a gang of men was employed removing about 2 to 3 feet of the surface soil of the basin, which was found to contain nodules of galena to such an extent as to yield about one ton of 200 oz. silver concentrates for 15 tons of soil. This "outside" work was being pushed to take advantage of the fine weather, which accounted for apparent neglect of "inside" work, which could be performed in bad weather.

The total shipments from the mine are reported as amounting in value to about $1,000,000, from which the various companies and owners have paid in dividends $400,000.

There are in this basin two well known veins, the *Idaho* and the *Cumberland*, which are parallel for part of their course, but the *Idaho* branches off abruptly to the south about the middle of the basin. The concentrates from the *Cumberland* ore run about 65 oz. of silver to 55 % lead, and from the *Idaho* about 106 oz. of silver to 55 % lead, while the concentrates from the soil of the basin, mentioned previously, run nearly 200 oz. of silver, which has led to the belief that the ore thus found in the soil of the upper basin came originally from the disintegration of the *Alamo* vein, which outcrops high in the bluff above the *Idaho* basin.

Mill.

The *Idaho* mill is on the Canadian Pacific Railway at Alamo, about one mile below Three Forks, and at the lower terminal of the aerial tramway already mentioned. The terminal storage bins have a capacity of 1,000 tons, and the mill has a capacity of 100 tons in 24 hours, but when visited, was running only on the day shift, putting through about 50 tons a day. From the storage bins the ore passed through a crusher to an ore bin with a capacity of 40 tons crushed ore, from which it is fed by an automatic feeder to rolls, from which it goes to the first elevator and trommels, etc. The plant consists of crusher, 3 sets rolls, Huntington mill, 2 elevators, 10 jigs, spitzkasten, 4 Wilfleys, and 2 extra Wilfleys to treat tailings from the first four.

The following assays were given by Mr. Ahier :—

	Silver, oz. per ton.	Lead, %.	Zinc. %.
Lead concentrates	64	56.5	13.2
Zinc 〃	30	1.2	40
Jig tailings	4.1	.2	....
General tailings	5.7	.4	....
Third screen, No. 7 jig	30.5	1.8	42.1

A saving is claimed for the mill of 95 % of the lead contents.

Vicinity of Sandon.

Slocan Star.

The *Slocan Star Group* of mines has been, and still is, one of the most successful of the district, having paid in actual dividends a larger amount than has any other metalliferous mine in British Columbia. The group includes the following Crown-granted claims:—*Slocan Star*, *Silversmith*, *Jennie*, *Slocan King*, *Emma*, *Windsor*, *Morning Sun*, *Shogo Fraction*, *Wyoming* (in part), *Echo Fraction*, *Ophir No. 3*, *Silver Star Fraction* and *Hidden Treasure*. The first five of these are reported as located under the old Mineral Act, and, consequently, have "extra-lateral rights," that is, they can follow the lead to the dip across their side lines, while the rights of the remaining claims are bounded by vertical planes through their respective boundary lines.

The property is owned and operated by the Byron N. White Co., of Milwaukee, Wis., of which Byron N. White is the president, and J. W. Dadmun secretary-treasurer, while the local manager is Oscar V. White. The capital of the company is $500,000, over 95 % of which is held by three persons. The company has paid in dividends to date $525,000, of which the last was $25,000, paid August 8th, 1904. The total shipments up to July 1st, 1904, were 32,453 tons, of which about one-third was shipped as crude ore, and the remainder as concentrates, and this carried 2,673,248 ounces of silver and 18,549 tons of lead.

The property is situated on a gently sloping hillside on Sandon creek, about half a mile from its junction with Carpenter creek, at the town of Sandon. The mine is opened up by five levels, all entered by cross-cut tunnels. The lead is a regular quartz fissure vein, cutting through and across the bedding of the black slate country rock, and accompanied by a zone of crushed slate country rock, having a normal width of 4 feet, but occasionally widening out to 30 feet. The outcrop of the vein, as it appears on the surface for 3,000 feet, is in shape like the letter "S," the general strike being east and west, while the dip is variable, averaging about 50°, and is south, or into the hill. The mineral usually occurs on the hanging-wall side of the vein, but occasionally ore is found on both sides. The ore occurs in chutes in the vein, of which there are two main chutes developed by the workings. These are from 100 to 150 feet wide, and extend from the surface as far down as the workings have gone, the silver values continuing with depth. Nearly parallel with the outcrop is a porphyry dyke or boss, which seems to be associated with the fissure and its mineralisation.

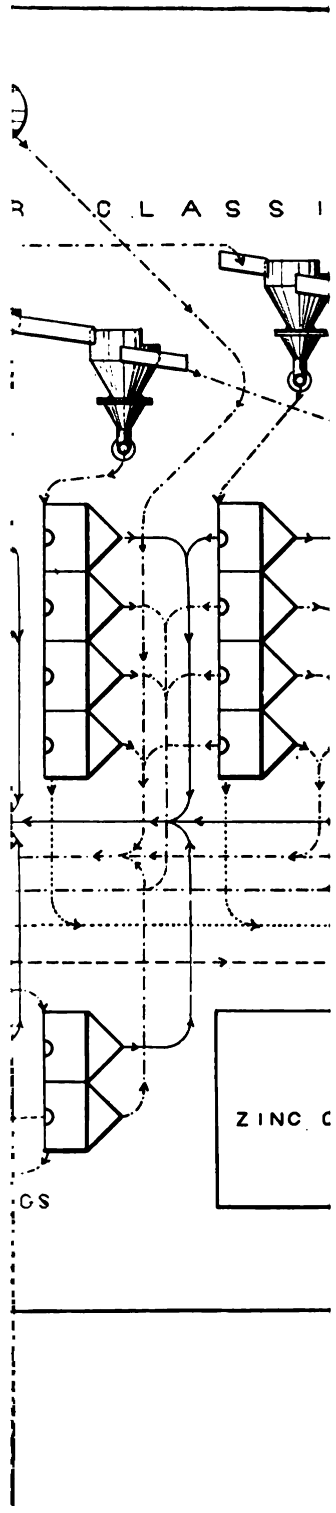
The company is at present engaged in litigation with the owner of the *Rabbit's Paw*, an adjoining claim, over "extra lateral rights," and as the mode of occurrence of the ore-body, etc., forms a strong determining factor in the suit, it is not considered proper at present to enter more fully into the occurrence of the vein.

The ore is argentiferous galena, carrying a little gray copper, and associated with zinc blende, spathic iron and iron pyrites, with a little manganese. While some ore is shipped as mined, the greater part of the product of the mine is concentrated in the company's mill on the property. The ore being mined at present comes, for the most part, out of No. 3 tunnel, from which it is trammed for about 100 yards to a temporary ore pocket of 200 tons capacity, and it is thence conveyed by a surface gravity tramway a distance of 1,500 feet to the mill-bins.

The old mine buildings were swept away by a snow-slide in 1903, and have been replaced by temporary structures, pending the completion of a No. 5 tunnel, which is to be run in from near the level of the mill-bins, much lower than the present workings, and out of the way of snow-slides.

The mill feed from July 3rd to 15th, 1904, ran as follows:—

MILL FEED.				GALENA RECOVERY.				ZINC RECOVERY.					
	ASSAY.				Assay.				Assay.				
Tons.	Ag. oz.	Pb. %	Zn. %	Tons.	Ag.	Pb.	Zn.	Tons.	Ag.	Pb.	Zn.	Fe.	Mang.
1,553	21	5.1	12	92.3	95.4	61	9.5	334	46.5	2.5	35	15	3



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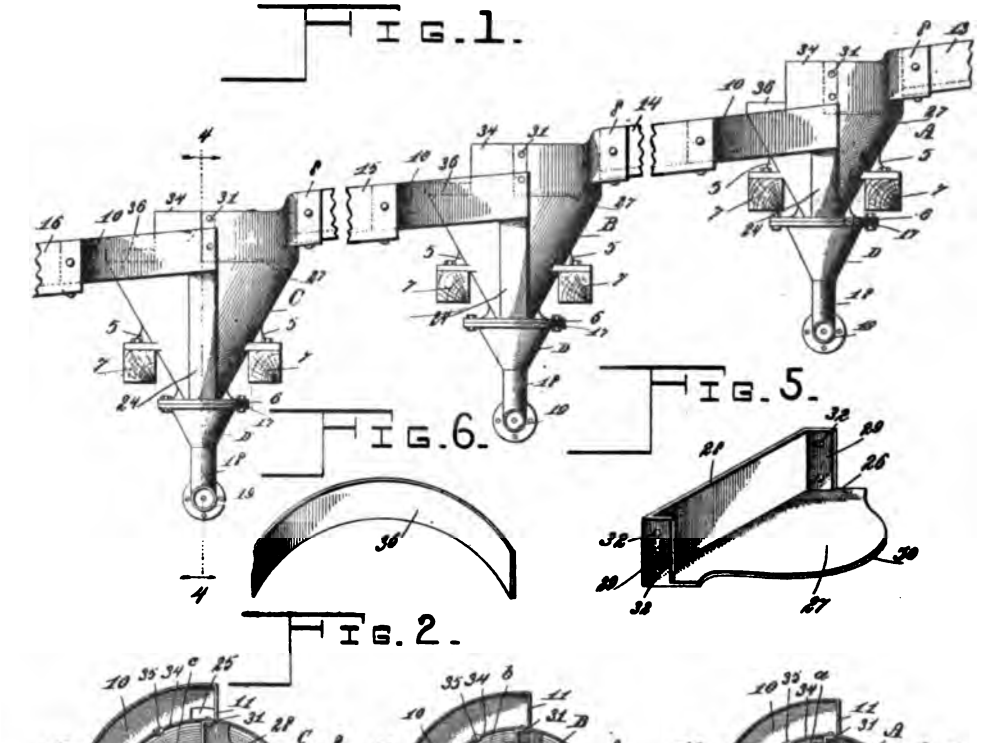


CULVER CLASSIFIER—USED IN SLOCAN STAR MILL.

As will be seen from the above, the zinc forms an important factor in the output of this property, and about 3,000 to 4,000 tons of zinc concentrates was found stacked upon the dump, the company having had no acceptable offer for it from the zinc ore-buyers, who offered an inadequate price for the silver, and objected to the percentage of iron and lead present. It is now reported unofficially that the company intends to erect a plant for the separation of the iron, etc., so enriching the zinc product as to meet the market requiremets.

Mill.

The company's concentrating plant is in charge of Mr. Chas. Culver, who has the reputation of being one of the most expert mill-men in the district, and who has brought the mill up to a high state of efficiency and economy. A "flow-sheet" of the mill accompanies this report, giving details of the mill and process. A cut is also given of the Culver classifier, with which the mill is provided, as it is efficient and contains some novel features. The mill is operated by water power, the water being taken from Sandon creek, and used under a head of 400 feet. The mill force consists of, on each of two shifts, 1 crusher man, 2 jig men, 1 tableman, and 1 trammer, with the occasional assistance of a blacksmith and a labourer.

Payne Mine.

The *Payne* mine is probably the best known silver-lead mine in British Columbia, and since 1892 has been one of the largest shippers. The ownership of the property changed about four years ago, and it has since been held by the Payne Consolidated Mining Co., a Montreal company, of which Lt.-Col. F. C. Henshaw is president, and C. H. Law is secretary, while the local management was in the hands of Mr. A. C. Garde until the late fall of 1904, when active operations ceased, since when the company's accountant, Mr. Geo. F. Ransom, has been acting manager. The property is situated on the north slope of Carpenter creek, about two miles below the town of Sandon, and on the line of the Kaslo & Slocan Railway, while from the mill a short wire-rope tramway leads to the Canadian Pacific Railway tracks in the bottom of the valley, permitting shipments to be made by either road. The property is well equipped with all essentials as to plant, buildings, etc.

The following statement, prepared by the manager, Mr. Garde, on August 31st, 1904, gives a correct idea of the plant and mine, while the accompanying plan and section of the mine, copied from a blue print plan, also kindly furnished by Mr. Garde, conveys a better idea than could otherwise be given, of the mine and the occurrence of ore:—

"This property was discovered in the fall of 1892, and has been in continuous operation ever since. More than 50,000 tons of silver-lead ore has been shipped, representing a gross value of nearly $4,000,000. Average value per ton for this period was $77.30. Average value per ton of concentrates for year 1903 was $83.32, assaying 124.5 ounces silver and 67.29% lead. Dividends paid since 1897 up to the present date, $1,438,000. Besides silver-lead, the *Payne* has within the past year produced between 3,000 and 4,000 tons of zinc concentrates, averaging about 50 per cent. zinc, 14 ounces silver, low in iron, lead and other impurities. Since 1901, the character of the ore in the *Payne* has changed from a clean galena into a concentrating ore, heavily mixed with spathic iron and zinc. The company has, therefore, during the past three years, completed a concentrating plant capable of handling 200 tons in 24 hours, and more than 125,000 tons of concentrating ore, including stope fillings and dumps, has been treated in this plant. The company has also within the past year added a zinc separating plant, by which the iron is separated from the zinc by means of magnetic concentration. Both of these plants are in operation now. The concentrating plant is located on the K. & S. Railway tracks above the C. P. Railway, and is conveniently situated for the handling of concentrates over either railway. The entire plant is run by water power, and to help out during the dry season of the year, an auxiliary 150 horse-power compound condensing steam engine is available.

There are two pipe lines, one 1,800 feet and the other 2,600 feet in length, furnishing power for four Pelton water wheels, two of which are 24 inches in diameter, one 18 inches, and one 12 inches. The maximum capacity of the high pressure line, under a 750-foot head, is 300 horse-power, while the capacity of the low pressure line, under a 450-foot head, is approximately 50 horse-power. Three of the water-wheels are used for driving the concentrator proper, while one 24-inch wheel is coupled to a 100 horse-power generator, furnishing power for the mine over a three-wire pole-line 5,500 feet long. The electric power at the mine is used partly for driving a three-drill compressor and partly for running a 50 horse-power hoist, besides furnishing light for the mine and all buildings at lower and upper terminals. The compressor and hoist are geared direct to induction motors, and the current of 2,200 volts is transformed to 220 at the mine. The high current for the hoist motor is carried into the mine by special insulated lead-covered cable.

Machinery.

"List of machinery comprising power plant, exclusive of concentrating machinery :—One three-rail gravity tramway, extending from the concentrator at the K. & S. Railway tracks to tunnel No. 5, a distance of 5,500 feet—average degree of incline 25°; difference in elevation between upper and lower terminals, 2,300 feet; capacity of bunkers at upper and lower terminals, 100 tons each; maximum capacity of tram cars, 5 tons; maximum capacity of tram per 24 hours, 500 tons. One high-pressure pipe-line, 2,600 feet long, 11 inches diameter at the upper end, working under a static head of 750 feet, designed to develop 300 horse-power; one low-pressure pipe line, 1,800 feet long, 4 inches diameter, working under a static head of 450 feet, capable of developing 50 horse-power; two high-pressure 24-inch special Pelton water-wheels, each 160 horse-power capacity; one high-pressure 12-inch special Pelton water-wheel, 30 horse-power capacity; one low-pressure 18-inch standard Pelton water-wheel, 30 horse-power capacity; one 75 K.W. three-phase alternating current generator, 2,200 volts, capacity 100 horse-power; one 2½ K.W. direct current dynamo used as exciter for above generator; one 7 K.W. direct current dynamo used for magnetic separator in zinc mill; two 2 K.W. dynamos, driving dust fan in zinc mill; one 150 horse-power compound condensing steam engine, at present developing 90 horse-power; one 90 horse-power tubular boiler, 54 inches by 12 feet, working under 90 lbs pressure.

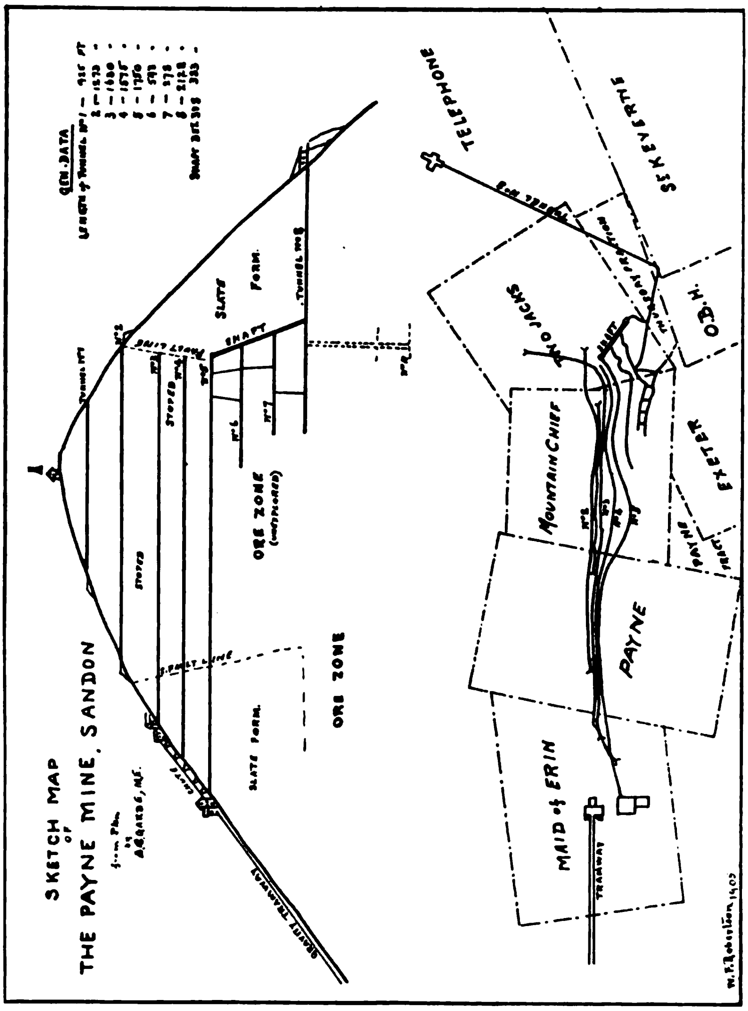
"At the mine :—One 50 horse-power duplex three-drill air compressor, geared to one 50 horse-power induction motor; one 30 horse-power electric hoist, geared to one 30 horse-power induction motor; one 15 horse-power duplex electric pump, capacity 100 gallons per minute, geared to one 15 horse-power induction motor.

"In addition to the above machinery, we have at the mine :—One Knowles sinking pump of 40 gallons per minute capacity, arranged for steam or air; one 25 horse-power sinking hoist, arranged for steam or air; one 12 horse-power gasoline engine (not in use); two Ingersoll-Sergeant 3¼-inch air drills; one Mac Machine Company 2¼-inch 'baby' air drills; one 20 horse-power boiler, used for heating purposes at mine boarding-house.

Mine.

"In regard to the mine, there are altogether eight levels, of which the upper five have been practically stoped out. Some cross-cutting is at the present time being carried on in No. 3 level, to demonstrate whether any other parallel fissures exist in the *Payne* ground. Tunnel No. 5, which is the principal working tunnel and the upper terminal of the tramway, is connected with levels No. 6, No. 7, and No. 8 by means of an incline shaft, 384 feet long. In all of these last-mentioned levels the *Payne* vein has been encountered and developed for some distance. A considerable quantity of concentrating ore has been taken out of these levels, and the company at the present time is engaged in driving the breast of same ahead, and is meeting with considerable prospect of opening still larger ore-chutes in the lower part of the ore-zone. A great deal of work has been done in level No. 8, where a new ore-chute of considerable value is uncovered for a distance of about 300 feet, showing up very strongly, and with all indications of going down. Recently a station has been cut in the east drift of tunnel No. 8, and arrangements are now being completed for the exploration of this ore-body to a depth of 300 feet, after which, if the results of this work will warrant it, a long tunnel, starting at some point lower down on the *Payne* mountain, will be driven with the view of tapping the vein and handling all ores from here, thus avoiding hoisting, and also allowing for drainage of the property."

The shutting down of this important property must be considered as a most unfortunate occurrence, and a distinct misfortune to the mining industry of the district, and while the preceding statement of the manager, Mr. Garde, written about a month before the shut-down, gives a very correct idea of conditions, a few notes from an independent standpoint may help to a fuller understanding of the situation.



As shown in the sectional plan, the vein cuts from side to side of the hill, while the ore-bearing zone appears to be confined to the central part of the hill, and has a sectional width

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of about 1,000 feet, with a barren zone on either side, that is, on either flank of the hill. As Mr. Garde says, the five upper levels have been practically stoped out, and the small patches of ore that remain are being taken out by "tributers." Between the No. 5 and No. 6 levels a dyke, locally known as the "white dyke," comes in, having a strike parallel to that of the vein, but, above its junction with the vein, a flatter dip. After meeting the vein, the dyke and vein follow the same dip and strike, that is, they are together, down to the lowest working level, No. 8, where the dyke cuts into the hanging-wall, while the vein, resuming its old dip, continues in depth into the unexplored portion of the ore-zone.

On levels Nos. 6, 7 and 8, where the dyke is in the vein fissure, the galena is largely replaced by spathic iron, and on these levels the mining has never paid expenses, all profit seeming to have vanished with the appearance of the dyke. On the vein, after the dyke leaves it, there is an exceedingly encouraging showing of ore, on which a winze has been started down, for which a station had been cut, an air hoist installed, and bins constructed. The winze being full of water, this showing was visible only for 15 to 25 feet from the point where the dyke left the vein, but even with what little could be seen of the ore showing, it was decidedly the most promising ore-chute seen below No. 5 level, and it is greatly to be regretted that active operations in the way of development should have ceased when the difficulties brought about by the dyke had been surmounted, and just as a fair promise was obtained of the renewal of the conditions prevailing in the upper levels before the advent of the dyke in question.

The mine, as it stands at present, is another victim of that short-sighted policy of gouging out all available ore, and neglecting the proper development, in advance, of further bodies of ore.

Queen Bess.

The *Queen Bess Group* has been one of the important mines of the district, having, under former owners, shipped ore of which the smelter returns show a value of about $225,000, the ore having had an average value of about $65 a ton, assaying about 100 ounces in silver and 70 % lead. The property is situated on the east slope of Howson creek, opposite the *Idaho* basin, being over the ridge from the *Monitor*. The property was on January 1st, 1904, acquired by the present owners, the Queen-Dominion Mining Co., Ltd., of which Robert Irving, of Kaslo, is secretary-treasurer, and George Potter, superintendent in charge of the mine. The property had been opened up extensively by five levels, exploring the contact vein for 1,000 feet, while from No. 5 an inclined shaft connects with No. 10, some 300 feet lower down.

The formation is slate, in which, along a strong fissure, occurs a crushed zone, several feet wide, carrying quartz, with galena, lead carbonates, and oxide of iron, but with very little zinc. The wall on one side of this fissure is unbroken, while on the other side the slate is "blocky" in character, and from the main fissure are several "spurs" of quartz making off at an acute angle. The mineralisation seems to have been greatest where these "spurs" joined the main lead.

The former owners had left little or no ore developed, so the attention of the present owners has been taken up in prospecting the property practically anew, and this they are doing steadily and systematically.

Ivanhoe.

The *Ivanhoe* mine is owned and operated by the Minnesota Silver Co., Ltd., President, W. H. Yawkey, with Phillip J. Hickey as local manager and superintendent. The *Ivanhoe* and *Elgin* claims are owned by the company, while 11 adjoining and surrounding claims are held in the names of Messrs. Yawkey and Hickey. The management reports that since the present company acquired the property in 1896, about $190,000 worth of ore has been mined and shipped, while previous owners are credited with shipping from 500 to 800 tons of ore richer than the average. The mine is situated on the south slope of Carpenter creek, about opposite the lower end of the town of Sandon, in a small basin among the peaks of the range, and at an elevation of some 3,000 feet above the creek.

The lead is a fissured zone in slate, having a strike of N. 80° E. (mag.), and a dip of about 50° into the hill, and contains a quartz vein carrying galena and blende. The outcrop cuts diagonally up the basin and into the bluff at its top, but the mining has been done chiefly in the basin. The mine has been opened up by a series of 8 levels, numbered from 1 to 8, starting from the top, of which Nos. 1, 2, 4 and 8 are connected with cross-cut adit tunnels of the following lengths:—No. 1, 75 feet; No. 2, 230 feet; No. 4, 465 feet; and No. 8, 1,310 feet.

No.	1	level is about	150	feet below	the surface	and is	260	feet long.
"	2	"	90	"	No. 1	"	220	"
"	3	"	100	"	" 2	"	800	"
"	4	"	100	"	" 3	"	1500	"
"	5	"	107	"	" 4	"	600	"

Nos. 6 and 7 levels are only started off from the raise, while No. 8 level, which is 320 feet lower than No. 4, has been driven for 385 feet to the east and west of the cross-cut tunnel.

The general ore-chute is, approximately, 360 feet long in the vein, and extends down to No. 8 level. No stoping or work was going on above No. 2 level, the greater part of the work being done between Nos. 2 and 4, where, also, most of the ore was being produced.

The vein proper follows the crushed zone in the slates, which in places acquires great width, and is filled with crushed slate and clay, between two smooth walls. On No. 3 the ore is found on both sides of the zone, and a level has been driven parallel to the main level, and connected with it by cross-cuts. The ore occurring here all through the zone made irresistible the temptation to extract it, and this was done, with the result that the filling of the fissure was undermined and began to show a tendency to slip down. This has been headed off only by timbering of the most substantial character, placed with great skill and at no little risk.

Another large body of ore occurs in a similar way on No. 8 tunnel, but here the danger had been more fully realised from the first, and an adequate amount and proper system of timbering had been used, so that here little danger exists, and everything seems to be held securely. This tendency of the zone to slip on the walls is general throughout the mine, and calls for great watchfulness and skill on the part of the mine foreman, besides adding considerably to the cost of mining.

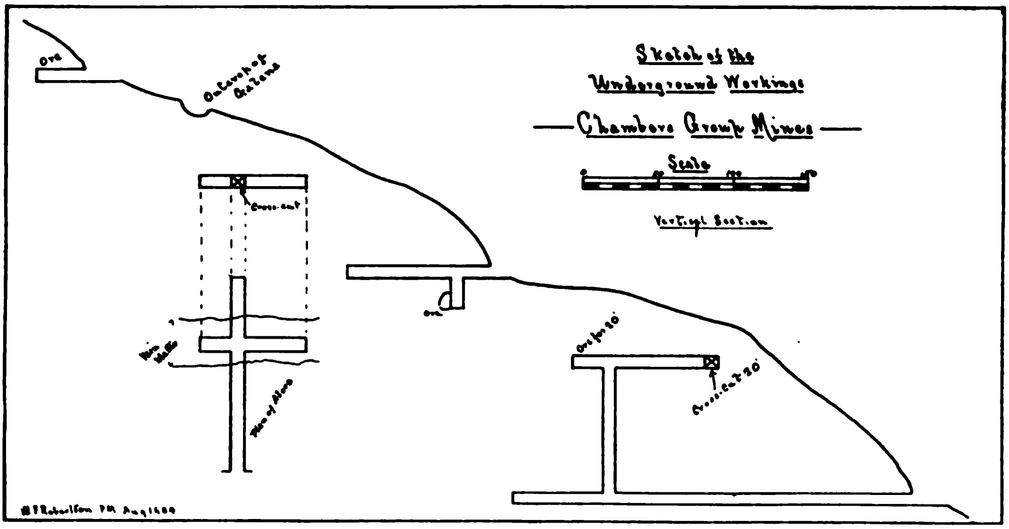
The ore is argentiferous galena associated with zinc blende, but, as compared with the other mines of the district, there is comparatively little spathic iron, the result of which is that the zinc concentrates produced are higher in zinc and lower in iron, and so command a ready market at a fair price. The ore is essentially a concentrating ore, but contains some clean ore, both zinc and galena, and while all the ore goes to the mill and through the Blake crusher, it is then fed on to a Robins picking belt, where as much as possible of the clean galena and blende is picked out by hand and dropped into separate bins; all of which is shown in the diagram or "flow sheet" of the mill, which accompanies this Report.

A Riblet aerial tramway, 8,500 feet long, and with a fall of 2,300 feet, transports the ore from the mine to the company's mill on Carpenter creek, on the line of the C. P. Ry. The mill was treating from 65 to 70 tons of ore a day of 12 hours, and producing about 7½ tons of galena concentrates, and about 3 tons of zinc concentrates. The lead concentrates are loaded directly from the mill and shipped "in bulk" in box-cars. They assay about 55 to 58 % lead, and from 85 to 90 oz. silver to the ton. The zinc concentrates vary in assay from 42 to 50 % zinc, depending on the class of machine producing them, but will average about 45 % zinc.

The company was employing in August about 62 men at the mine and 4 in the mill.

Chambers Group.

The *Chambers Group* includes the *Jay Gould*, *Eureka*, *Chambers* and *Wellington* mineral claims, situated on the north slope of Carpenter creek, about two miles above the town of Sandon. The property was worked this past year by a local syndicate, and some small quantity of ore was taken out. There is on the property a strongly fissured zone from 5 to 10 feet wide, cutting through a slate formation in a N.E. and S.W. direction, with a dip of about 80° to the N.W. Following in this fissure up the gulch, a series of tunnels has developed a quartz vein, in which occur chutes of argentiferous galena, which, after being hand-sorted, is shipped by pack-train to Sandon, and gives returns of about 70% lead and 125 oz. silver to the ton. The character and extent of the development is shown by the accompanying rough sketch of the workings, made from paced and estimated measurements only.



Reco Mine.

The *Reco* Mines include the *Ruecau*, *Texas*, *New Denver*, *Ephraim Fraction* and *Clifton* mineral claims, situated on the north slope of the valley of Carpenter creek, near the summit of the range, and about 4 miles from Sandon. The property is held by the Reco Mining and Milling Co., Ltd., of Sandon, capital $1,000,000, of which John M. Harris is the president and manager of the mine. There are three known veins on the property, all more or less parallel, having a strike about N. 55° E. with a dip to the S.E. of about 70°, and cutting the formation nearly at right angles.

The rock formation of the vicinity is a dark slate, with a strike to the bedding of about N.W. and S.E., while, parallel with the bedding, the slate is cut by a large number of porphyry dykes varying greatly in size. Immediately below the mine workings, cutting through the *Texas* and *Deadman* claims, there is one of these dykes, of great width, reported by the management to be, by actual survey, 1,050 feet wide, while in the mine workings some 18 dykes have been cross-cut, having widths varying from 2 inches to 24 feet. That the most of these dykes were "in place" long before the vein fissure was formed, is proved by the fact that in the tunnel the vein cuts them all, and further, that the values in the vein seem to be about the same where it cuts through a dyke as in the adjacent slates.

Of the three veins mentioned, the best known is the most easterly, the No. 3, or, as it has been called, the *Reco* or *Goodenough* vein, which cuts through from the *Goodenough* into the *Reco* ground, and which has been developed by a series of cross-cut tunnels run in on *Goodenough* ground near the dividing line, at the joint expense of the *Reco* and *Goodenough* mines, from which cross-cuts the respective companies have run drifts on their own portions of the vein.

The vein in the *Reco* ground is found between clean, hard walls, from which the ore parts readily, and in width varies from a mere rusty streak up to about 24 inches, having an average width of about 6 inches of quartz, etc., of which an average of about 3 inches is solid ore, which consists of the silver sulphides, argentite, ruby silver, and some galena, with gray copper and zinc. The ore is easily hand-sorted in the workings, no grade being produced other than shipping ore, which, for the first five years that the property was operated, from 1894, averaged, as shipped, 309.6 oz. of silver to the ton and 46% lead. Latterly, however, shipments have been somewhat lower in grade, lower freight and treatment rates not calling for such close sorting, and average about 225 oz. in silver and 55% lead. Zinc is present in the ore, but in unimportant amount, being about 5%.

The mine is opened up by tunnel No. 2, 900 feet long; No. 4, a cross-cut of 57 feet and drift of 1,050 feet; No. 6, a cross-cut of 270 feet, and a drift 1,025 feet long; No. 7, an intermediate "blind" level, is 640 feet long. No 8 has a cross-cut 350 feet, with a drift of 550 feet. Although some ore still exists above levels Nos. 2 and 4, the vein has been pretty well stoped out as far as the levels have been run, and the greater part of the ore known is between Nos. 7 and 4. Comparatively little ore has come out of No. 8 level as yet, but it is possible that the ore-chute on No. 7 will go down and be found on the production of No. 8.

It is of more than passing interest to note the values which have been extracted and realised upon from this small vein. Mr. Harris reports that, as worked up to the present, the vein alone has produced on *Reco* ground about $700,000 from ore shipped, while from the vein in *Goodenough* ground another $100,000 was mined. The original cash outlay for the purchase of the mine and its development was $2,700, while in 10 years there has been paid in dividends, chiefly from this vein, $287,000.

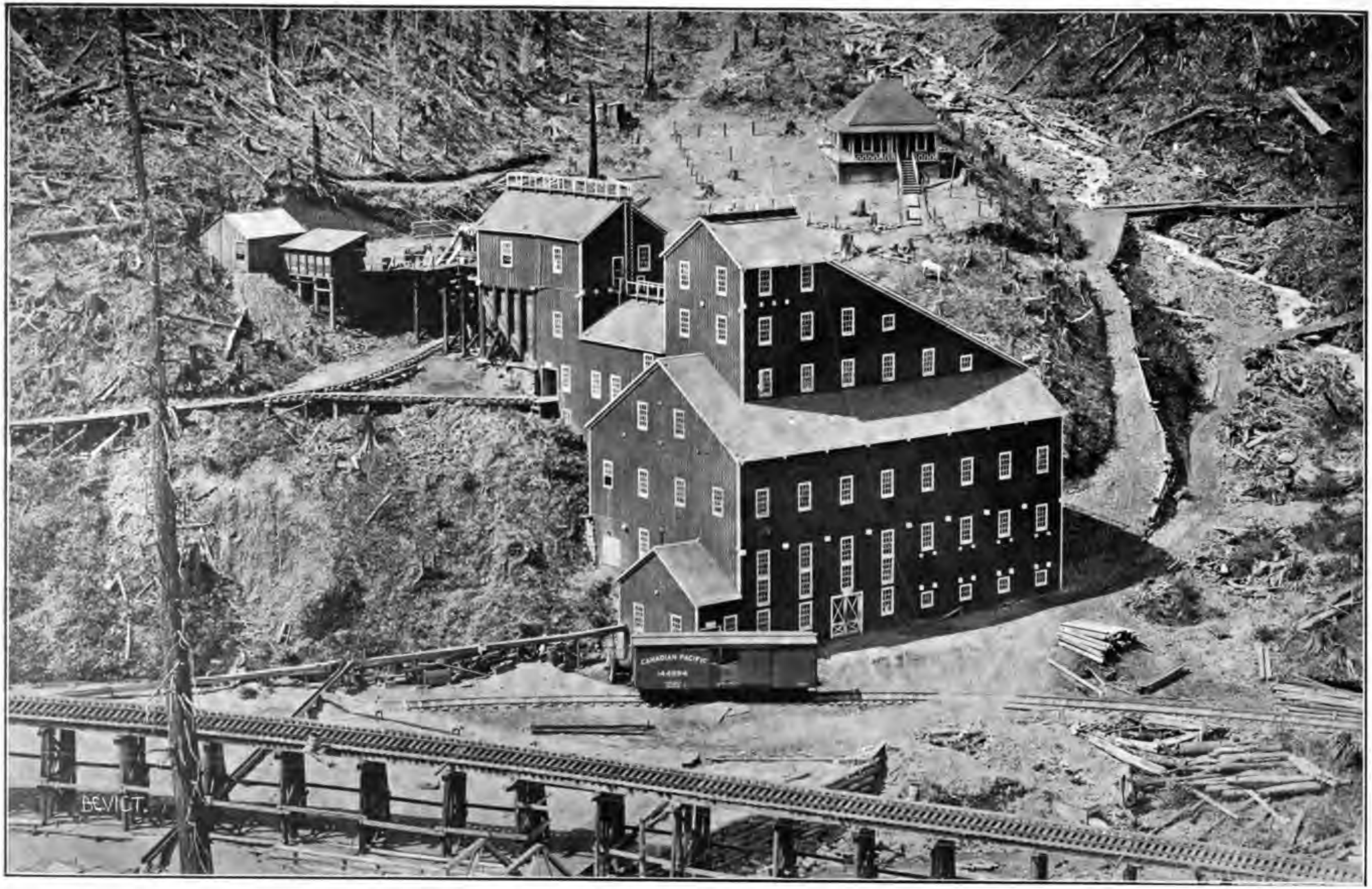
About 750 feet to the west of No. 3 vein and higher up the hill, is the No. 2 or "Big Vein," which is practically parallel with No. 3, and, as far as can be traced, cuts the same dykes. This vein has been opened up by adit tunnels on the vein, of which No. 1 is about 600 feet long, No. 3 is 850 feet, and No. 5 is 275 feet, while between Nos. 3 and 1 an intermediate has been driven for 330 feet.

(NOTE.—The levels on No. 3 vein are designated by the even numbers and those on the "Big Vein" by the odd numbers.)

The stoping that has been done is all above No. 1, except one small stope. No stoping has been done on the intermediate, but in driving this tunnel 60 feet, this past winter, the two contractors sacked up about 40 tons of good ore.

Above No. 1 tunnel, stoping has been done for a length of 350 feet and for a height of from 40 to 50 feet. The height between No. 1 and No. 3 is about 140 feet, which ground has not yet been stoped.

This "Big vein" is considerably larger than No. 3 and the ore is lower in grade, but the lead has as yet only been developed, and proportionately little has been shipped, attention having been centered on the higher grade ore in No. 3. Still, shipments from this vein sum up to the not inconsiderable amount of $90,000.



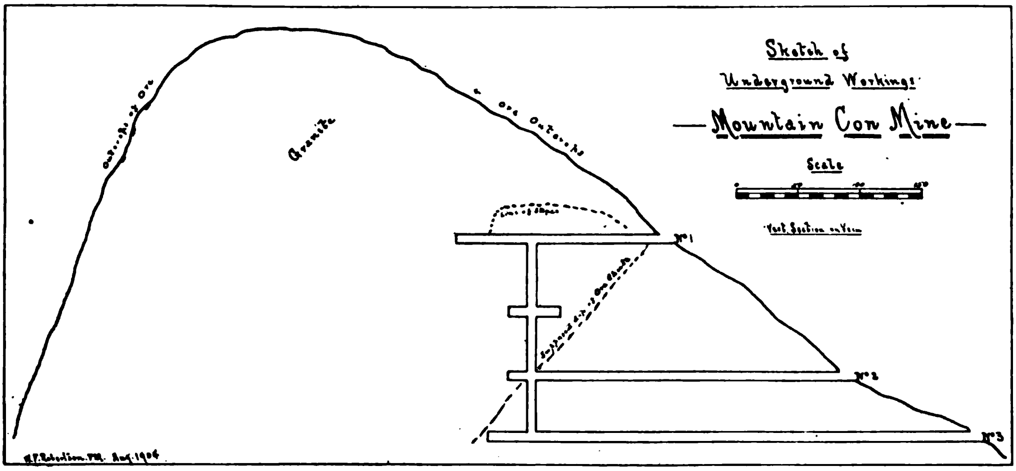
IVANHOE CONCENTRATING MILL, SANDON, B. C.

The mines were worked regularly until 1903, but since that date it has been the practice of the company to mine for four months and develop for four months. The ore is rawhided in winter down a trail to Sandon, from whence it is shipped by rail.

The property was not working when visited in August, but arrangements were then being made for the resumption of work by September.

Mountain Con.

The *Mountain Con* mine is situated in a basin about the head of the south fork of Carpenter creek, at an altitude of about 8,000 to 8,500 feet, and at a distance of seven or eight miles from the town of Sandon, from which point it is reached by a waggon road to Cody, and thence by a trail leading up the north side of Carpenter creek along a hillside on which snowslides are so frequent in spring as to render the trail most hazardous at that season of the year. The trail from Cody to the basin below the mine is on a fairly even and light grade, with a good, solid bottom, and a waggon road could be built along its route, but from the basin up to the mine, the last mile, the trail is very steep, and winds around among great masses of granite rolled down from the peaks above, with no earth covering them, and offering a very precarious footing for animals. Should the development of the mine at any time justify it, an aerial tram could be run from the mine to the basin, thus eliminating the last and worst part of the trail.



At present the cost of packing ore from the mine to the K. & S. railway at Cody is about $12 a ton, and of conveying supplies from Sandon to the mine $20 a ton.

Within this past year this property has been so successful that it has caused more interest than almost any other claim in the Slocan. The property has been well known for several years, and was held by three individuals, who on two or three occasions have given a bond on it to various parties, who, after doing some work on it without finding ore, each in turn threw up the bond.

One of the original owners, C. A. McLeod, a miner, despite the many set-backs the property had had, always maintained a strong faith in it, which was not shared by his partners. McLeod, consequently, took a lease and bond on the property, and operations were begun this last year, under a partnership of McLeod and Thompson. The firm was fortunate enough, after comparatively little work, to strike a chute of very rich ore, from which has been mined and shipped this past summer some 200 tons of ore, of which the average assay, from the smelter settlements, was 337 ounces silver to the ton and 27 per cent lead, making the value of the ore $200 per ton, and the gross value of the shipments a little more than $40,000, which amount has not only covered the purchase price of the mine, and working expenses, but has left a substantial net profit as well.

The rock formation in the vicinity of the mine is granite, the ore-body occurring in a regular fissure vein of quartz, cutting through an abrupt and bare granite peak. The strike of the vein is N. 40° E., with a dip of 80° to the N. W., and its width is about 18 inches of quartz, with perfectly clear walls of solid granite. Almost exactly parallel to the vein, and about two feet from it, is a slip joint in the granite, which is found to be of great assistance in the working of the vein, since this two feet of granite is easily broken free, and, with the width of the vein, gives sufficient room in the levels and raises, while, in the stopes, only the vein is mined. The fissure is straight and true, giving straight levels with smooth walls, and the only timbering required is in the raises, with a few stulls where stoping has been carried up from the level, enough waste being produced in mining to serve as filling. The conditions for economic mining are ideal, and such as are seldom met with.

The vein quartz is somewhat crushed, and is easily mined, and contains ore consisting of galena, with lead carbonates and iron oxides, carrying average values as already indicated by the shipments, of 337 ounces of silver to the ton, but of which shipments one carload assayed 543 ounces silver to the ton. The gold values are neglectable. The ore occurs in a chute, the width of which has not been determined, and which appears to dip into the hill from the outcropping at an angle of almost 45.°

The previous bonders of the property had run in tunnels on the vein below the surface outcroppings, but as the chute of ore dipped into the hill, the tunnels, not having been driven far enough, failed to strike it, which accounts for the bonds being forfeited. Accompanying is a rough sketch, prepared merely as illustrating these notes, and to give an idea of the various workings and their relations to the ore-chute.

A production of No. 1 tunnel for from 250 to 300 feet, would come out to daylight on the far side of the peak, where, above the tunnel level, on the almost precipitous face of the hill, it is reported that there are outcroppings of the vein carrying some exceedingly high-grade ore. The property has much promise, and is one of the most interesting of the small high-grade properties of the district. It is recently reported that the property has been bonded by McLeod and Thompson to M. S. Logan, of Nelson, and that he has disposed of it to certain Chicago capitalists for $67,000, subject to an inspection in the spring by their engineer.

Rambler-Cariboo.

The *Rambler-Cariboo Group* includes the *Rambler*, *Caribou*, *Antelope*, *Tiger* and *Best Fraction* Crown-granted mineral claims, situated well up in McGuigan basin, at an altitude of about 6,000 feet. This property has, under various ownerships, been one of the large shippers of the district. It is now held by the Rambler-Cariboo Mines, Ltd., a company with a capital of $1,250,000 and head office at Kaslo; president, A. F. McClaine, of Tacoma; general manager, Mr. W. E. Zwicky, of Kaslo.

The rock formation of the district is slate, through which a great boss of granite has been forced up, the whole being much cut by porphyry dykes. A well-defined quartz vein cuts through both the slate and the granite, and across the contact, and has been traced on the surface for a long distance, in a north-east by north direction, with a dip to the south or into the hill.

The mine was originally opened up by three cross-cut tunnels, connecting with levels about 100 feet apart. No. 3 is the main working tunnel, and has a cross-cut 510 feet long to the vein, and drifts to the extent of over 1,200 feet. Above this level all the ore, except a few small bunches, has been extracted some time ago. The lower workings were flooded and could not be seen. From this No. 3 level a shaft has been sunk for 500 feet, with levels Nos. 4, 5, 6, 7, and 8, at intervals of about 100 feet, and here the recent productive mining has been done. From the shaft, drifts have been driven; at No. 4 level, to the north for 63 feet, and to the south for 350 feet; at No. 5 and No. 6 levels, to the north 280 feet, and to the south 350 feet (most of which ground has been stoped); at No. 7, to the north 231 feet, and to the south 324 feet, of which 250 has been stoped; and at No. 8, to the north 94 feet, and to the south 101 feet. From this shaft and levels some very good ore was obtained, and it is reported by the management that the ore-body is strong in the bottom of the shaft and is continuing with depth. The cost of hoisting from this shaft to a higher level, together with the cost of keeping it unwatered, added so much to the cost of mining that the company decided to abandon the workings temporarily and to run a long cross-cut tunnel in to the vein at the 1,400-foot level, putting up a raise in continuation of the shaft, thus reaching the known ore-body from below.

Mr. Zwicky says he feels sure he has "sufficient ore in sight on levels 7 and 8 to liquidate any loan secured to complete the new work."

New Cross-cut.

The portal of the new tunnel is located on Dardanelles creek, about half-way between McGuigan station and the mine, and near the waggon road. The tunnel will be 9½ feet high by 7 feet wide (7½ by 7½in the clear) and about 4,300 feet long, cutting the vein over 1,400 feet deep, or 600 feet deeper than No. 8 tunnel. It will take about two years to complete this tunnel (till July, 1906), and it will cost approximately $60,000, exclusive of cost of plant. This tunnel was started on July 9th, 1904, and by September 1st it had been driven 460 feet, the work being done under contract, and progressing at the rate of about 11 feet a day, the compressed air being supplied by the company from its new plant on Dardanelles creek.

In view of the changes being made, very little work is going on in the upper workings, only 6 men being there employed, while in No. 14 tunnel the contractors were running three shifts with 12 men.

The company's concentrating mill, located just below No. 3 tunnel outlet, was employed running through the second and third class ore-dumps, which would probably be cleaned up in 1904. This old dump is estimated to run about 3 % lead and 20 oz. silver to the ton, and the ratio of concentration is about 12 into 1. The concentrates run about 35 % lead, 112 oz. silver, 11 % zinc and 18.5 % iron. The first-class shipping ore runs about 280 oz. in silver, 50 % lead, and under 10 % zinc. The mill is old, and rather out of date, but as the whole plant will shortly be moved to No. 14 tunnel mouth, any great expenditure on it would not be justified. The tailings run about 2½ % lead and 10 oz. silver and are being impounded, an estimated amount of some 20,000 tons being so stored up.

The air compressor plant has already been moved down the hill to a point below No. 14 tunnel, and is operated by water power, the water being taken out of both McGuigan and Dardanelles creeks, and conveyed from the flume to the plant in a pipe-line 1,600 feet long, tapering from 12 to 8 inches in diameter. The water is used under a head of 750 feet to operate a 36-inch Pelton wheel, which is connected by a belt to a 10-drill Rand air compressor.

The company will, for the next two years, be engaged entirely in development and construction, for which the previous production of the mine and the showing reported in the No. 8 level would seem to give ample justification.

A little higher up the same basin is the *Antoine*, of which George Alexander, of Kaslo, is the manager. This property was closed down in November, 1903, and has not since been worked by the company, but a couple of men working on tribute took out this past year about two carloads of ore.

The *Red Fox*, in the same basin, has not been operated by the owners during the past year, but two men have been working on it as "tributers."

The *Washington* has been under development, but has shipped no ore this past year. This property is reported to have in sight, in the mine, a large tonnage of ore high in zinc, which will soon, it is hoped, be extracted and shipped.

The *R. E. Lee* was under development in a small way, and shipped one car-load of ore.

The *Sunset* and *Trade Dollar*, operated by G. W. Hughes, is on the summit of the divide between McGuigan basin and Carpenter creek. The property has been extensively developed, and a large quantity of ore shipped, but during the past year only a small amount of work, chiefly exploratory, has been carried on; the property is reported, however, to have shipped over 300 tons of ore.

Lucky Jim.

The *Lucky Jim* mine is situated on the slope of the hill south of Bear lake, 600 feet above the line of the K. & S. railway. The property has been opened up for many years, and has had an eventful history, as it contained large masses of galena, but also so much zinc blende as to interfere with the sale of the galena without some means of separation. In places the ore is entirely zinc blende, nearly free from galena—so much so that the mine has been looked upon as more a zinc than a galena mine.

The country rock formation of the vicinity is slate and limestone in beds, and near these contacts a vein cuts both formations in a general N. E. and S. W. direction, with a nearly vertical dip. Where this vein cuts through the slate, it appears to be but a few inches in width, but in the limestone it opens out into large chamber-like deposits, sometimes 30 feet wide, in which the ore, galena and zinc blende is nearly solid. These chambers seem to be "chimneys," with irregular dimensions and dip. The galena carries about 70 per cent lead and 70 ounces silver, while the zinc blende assays about 50 per cent zinc and 5 ounces silver.

The property has been very extensively opened up, but in a very irregular manner, by tunnels into the hillside and by great open pits. The mine was recently purchased by G. W. Hughes, of Sandon, who is opening it up again in a more scientific way, the mine workings being in charge of John Wolverton as manager. The workings from No. 2 cross-cut up to the surface, a height of 200 feet, are being properly equipped with tracks, chutes, etc., and will soon be in shape for a regular output. There is certainly a large quantity of ore in sight, but the workings were not in such a condition as to permit of even an approximate estimate as to the tonnage.

On the face of the hill, near the outcrop of the vein, but apparently not connected with it, there is a big open pit, with a face of 30 feet of pure black zinc blende. Mr. Hughes shipped about 1,000 tons of zinc ore to the Kaslo Smelting Works, where it was weighed and sampled, and bids were asked for on these samples, but as this was done late in the year, results were not obtained by the close of 1904. A number of tons of mixed galena and zinc ore were sent to the *Payne* mine concentrator for separation. There is a gravity surface tramway from the mine workings down to the railway track, where bunkers are provided. The mine is well equipped with all necessary bunk-houses, etc., and a small air compressing plant.

SLOCAN DISTRICT.

Report of E. E. Chipman, Gold Commissioner.*

While the expected improvement in the condition of the mining industry in the Slocan District in 1904 has not been fully realised, yet sufficient advancement has been made to encourage the belief that there will be a marked progress for the better in the year 1905. The past year may be considered as one of investigation and of change—investigation for the obtainment of the most favourable markets for the disposal of the zinc ores, and change in the methods of treatment to arrive at the most economical methods of saving such ore.

In former years, the silver-lead operators had to contend with a large percentage of zinc in their ores, and to such an extent as to render a large proportion of their output valueless. From the increased price and demand for zinc in the past two years, the mine-owners realised that they had a valuable product in their zinc ore, if it could be prepared to suit the market. For this preparation they found that their silver-lead concentrators were almost entirely useless, unless they were remodelled to meet the new conditions. For this reason, operation, outside of development, was largely discontinued until the mills could be changed so as to permit of the saving of the zinc as well as the lead. Thus far, five of the mills have been remodelled, and are now adapted to the saving of both ores. These changes in the mills during the year will, in a measure, account for the decrease in the silver-lead tonnage. This decrease, however, has been more than made good by the output of over 4,500 tons of zinc ore, a new product in the history of the Slocan.

To facilitate the treatment and handling of these ores, the Kootenay Ore Co., which has successfully operated a custom sampling works, is now engaged in completing the addition of a zinc separating plant at the works at Kaslo, where it will undertake the treatment of zinc ores. This plant is expected to be in operation about the middle of March. Another large plant of the same character is under construction at Rosebery, and will be completed and in operation in the spring.

A new feature in the mining operations in the Slocan is the large and increasing number of mines which are being successfully worked under lease. These leases are not only materially adding to the output of the district, but are bringing a number of the old and practically abandoned mines again into the list of shippers.

The improved facilities for the handling and treating the ores; the advanced prices for both silver and lead; the opening of a market for zinc, a hitherto unsaleable and detrimental product; and the extended development of the past year, make the outlook for 1905 most encouraging.

AINSWORTH MINING DIVISION.

The progress in this Division during the year has been marked by an increased development, and, as a consequence, some valuable bodies of ore have been uncovered, notably on some of the mines on Woodbury, south fork of Kaslo, Cooper, Lake and Cascade creeks. When the projected trails on some of these creeks are completed, so as to enable the miners to move their output, there will be a very considerable increase in the shipments.

Duncan River.

The *Irene Group*, located on the upper Duncan river, had two men employed all summer, who did 150 feet of development, drifting on the vein. A continuous chute of ore was encountered 40 feet in length, and from 8 to 15 inches in width. The ore runs from 30 to 60 ounces of silver and 65 per cent. lead. The work is closed down for the winter.

**See* also Report of Provincial Mineralogist, page 147 *et seq.*

On the west fork of the Duncan river, the Old Gold Company did a considerable amount of development work, and employed a small force of men during the summer months. They claim to have 50,000 tons of ore in sight and blocked out, and ready for shipment as soon as transportation facilities can be provided. The work is now closed down, and I have been unable to obtain accurate data of the operations of the company.

On Hall creek some valuable bodies of ore have been uncovered, and it is the intention of the owners to work their properties extensively next summer. The *Bannockburn Group* on this creek, which was developed to a considerable extent some years ago, partially changed hands late in the year, and the new management is making preparations to work the property extensively next year.

On Hamill creek, the Argenta Mines Co. has steadily prosecuted development, with a force averaging 8 men for the year. Eight hundred and seventy feet of tunnelling, and an upraise of 156 feet, have been accomplished, and numerous cross-cuts have been made to show the size and extent of the ore-bodies. The management is entirely satisfied with the progress made, and has the utmost confidence in the value of the property.

The *Lavina-Butte Group* of mines remain closed down, pending the completion of the waggon road, which will enable them to ship ore, of which they claim to have large bodies. Other claims on the creek have done little more than assessment work, and no claims are known to have expired.

SOUTH FORK OF KASLO CREEK.

On this creek the most extensive operations have been carried on by the Silver Star Mining Company, on the *Cork* mine. Two tunnels have been driven on the ledge; the upper one 250 feet in depth, and the lower one, 240 feet deeper, 1,000 feet in depth. A raise has been made, connecting the two tunnels, in ore all the way, and a cross-cut of 70 feet, made in the ore-body, has failed to reach either wall. The ore is silver-lead-zinc in character, and the estimates of amount of ore in sight range from 150,000 to 250,000 tons. A 100-ton concentrator is nearly completed, which the management intends to operate to its fullest capacity. A small force of men has been constantly employed on development work during the year.

The *Province Group*, consisting of six adjoining claims, is on the same vein, and shows the same characteristics, with apparently as large bodies of ore. Two or three men have been engaged in development the greater part of the year, and it is estimated that 10,000 tons of ore are blocked out. The management contemplates the driving of a 1,200-foot tunnel at a lower depth than the present workings, and the erection of a concentrator to handle the output.

The *Bismark Group*, south and east of the *Province* and the *Cork*, is a high-grade silver-lead property. Four men have been steadily employed in taking out ore and in development. One hundred and ten tons of ore have been produced during the year which have netted the owners a handsome profit in their operations. In the course of development, late in the year, a body was uncovered of 8 feet in width of carbonate ore, carrying high values in both silver and zinc, which gives a very bright outlook to this mine.

The *Gibson*, another old-time property, has been worked under lease by two men, who have shipped about 40 tons of ore, which has well paid them for their labour.

A small quantity of ore was shipped from the *Silver Bell*, which carried high values in silver. The *Sturgis Group* was worked the greater part of the summer, and a valuable body of high-grade silver-lead ore has been exposed, which the owners intend working steadily next year.

The *Black Fox* and *Montezuma*, which have been idle for some years, are expected to resume operations next year, in consequence of the increased facilities for handling zinc, of which the ores in both mines largely consist. The *Bell Group*, on the opposite side of the creek from the *Bismark*, is being worked under lease, and it is reported the lessees have a promising body of ore.

KASLO CREEK.

At Whitewater, the *Whitewater* mine is being worked by lessees, the output for the year being about 100 tons.

The *Whitewater Deep* shipped a small quantity of ore, and there was 275 feet of development work done.

The *Echo* and *Alameda* did considerable development work during the year and shipped 20 tons of high-grade silver-lead ore.

The *Jackson* mines, consisting of five Crown-granted claims, are situated on Jackson creek, about five miles from Whitewater station, on the K. & S. railway, to which place there is a good waggon road. No ore was shipped during 1904, the company being engaged in remodelling their concentrator to adapt it to the saving of both the lead and zinc, of which the ore largely consists. Considerable development work was done, with gratifying results.

The *Empress* and *Silver Glance* mines are situated near Bear lake. Both have worked steadily during the year with a small force of men at each. The former is credited with shipping 12 tons of ore which netted the owner over $3,000. The latter did 200 feet of development, and shipped 24 tons of ore, which fully remunerated the owners for their outlay. The character of the ore in both mines is dry, carrying very little lead.

On Spring creek, near the head of Jackson creek, are two claims, the *Goat* and the *Cowboy*, both under lease and bond. On the *Goat* a shaft has been sunk to a depth of 15 feet, disclosing a streak of from 3 to 15 inches of high-grade silver-lead ore. A tunnel has been run during the year, a distance of 168 feet, to tap this showing at a lower depth, and is still being pushed. On the *Cowboy* a shaft has been sunk 40 feet, and drifts and upraises have been made to the extent of 40 feet, and nine tons of ore have been extracted and shipped.

WOODBURY CREEK.

The *Baltimore* worked two men steadily during the year in development, and made a trial shipment of five tons, which netted the owners $1,300. Work will be prosecuted steadily the coming year, and the ore will be shipped during the rawhiding season this winter.

The *Pontiac Group* has also been worked steadily by a small force of men, and shipped one car of ore during the year. In the course of their operations in driving a cross-cut tunnel a vein was cut, three feet in width, carrying exceptionally high values in silver and copper.

The *Grant*, which made a shipnent of some high-grade ore some years ago, has changed hands and is now being developed by the new owners with a small force of men.

The King Solomon Mines Company has employed a small force of men in developing their numerous properties. They have about 60 Crown-granted claims on the creek, 30 of which were obtained during the year.

AINSWORTH CAMP.

The *Highland* mine, near Ainsworth, has worked steadily during the year, and up to August employed about 70 men in the mine and mill. The mine produced over 14,000 tons of crude ore, from which 2,156 tons of concentrates were obtained. In addition to this 156 tons of clean silver-lead ore was marketed. The mine, during the first half of the year, was the largest shipper of lead in the Province. The mill was closed down about the 1st of September, since which time 25 men have been employed in development work. Over 1,200 feet of work was accomplished in the mine, and a large amount of open cut-work was done on the surface.

The *Highlander* mine, owned by the Highlander M. and M. Co., did some development work on their long tunnel, which is now in about 2,500 feet. The mine has a large quantity of silver-lead ore exposed, but no ore was shipped during the year.

Some development work was done on the *Number One* mine during the year. At the present time the upper workings are under lease, and some high-grade silver-ore is being obtained, but no ore has been shipped.

Important discoveries of ore are claimed to have been made on Coffee creek in the past summer, but no data are at hand as to their extent. Little else has been done during the year except assessment work, which has been fairly well kept up.

No important work was done on Crawford creek during the year.

OFFICE STATISTICS—AINSWORTH MINING DIVISION.

Free miners' certificates, personal	495
" " companies	9
" " special	3
New claims recorded	391
Transfers recorded	113
Certificates of work issued	609
Payments in lieu of work	22
Water records issued	17
Pre-emptions issued	35
Certificates of improvement issued	94
" purchase issued	32
Crown-granted mineral claims on roll	1269

SLOCAN MINING DIVISION.*

REPORT BY ANGUS McINNES, MINING RECORDER.

I have the honour to submit herewith my annual report of the progress of the mining industry in the Slocan Mining Division for the year 1904 :—

The *Slocan Star* has been worked steadily throughout the year, under the management of O. V. White, with an average force of 35 men. It has produced during the year 2,670 tons of silver-lead ore, besides a very large tonnage of zinc, which is being piled up on the dumps. The management contemplates erecting a large zinc plant this coming year, for the purpose of treating the zinc on the ground. There has been a large amount of development work done during the year, which leaves the mine with a large tonnage of galena and zinc blocked out.

The *Ivanhoe* has also been worked steadily during the year, under the management of Mr. P. J. Hickey. The ore shipments for the year have been 1,380 tons of galena ores, and 1,070 tons of good quality of zinc. The average number of men employed is 75. This mine has also a large amount of ore in sight and blocked out.

The *Payne* mine has been working with a reduced force for the most part of the year. The ore shipments are 1,110 tons of silver-lead ores and 970 tons of zinc, the average number of men employed being 25. Mr. Garde, manager for the last three years, has resigned, and Mr. Ransom is now acting manager. There are certain levels of the mine working under lease, and it is said the lessees are doing well.

The *Reco* has been working with a slight increase of force during the year. Mr. J. M. Harris is manager and part owner and has at present 40 men employed. The shipments for the year were 950 tons of high-grade silver-lead ores.

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* See also Report of Provincial Mineralogist, page 171.

The *Ruth*, managed by H. B. Alexander, working a small force, has shipped 450 tons of ore, which was mined in the course of development.

The *Last Chance* mine has shipped 380 tons of ore during the year, with a small force of men, employed under the management of Mr. L. Pratt.

The *Sunset* mine is also worked with a small force, and has shipped 313 tons of very good ore. The principal owner is Mr. G. W. Hughes.

The *Mountain Con* has, within the last year, developed from a prospect into a mine. About a year ago it was taken over from the owners under a lease and bond by Messrs. McLeod and Thompson, for, it is understood, the sum of $25,000, and in that time they have taken out enough ore to pay for the property, besides having a good surplus for development. The amount of ore shipped was 200 tons of high-grade ore.

The *Blue Bird* has been worked on a small scale during the year, and shipped 20 tons of very good ore.

The *Sovereign* has been worked under lease during the first part of the year, and shipped 30 tons.

The *Idaho*, under the management of Mr. P. D. Ahier, has during the year shipped 980 tons of high-grade ore, most of which has been reduced in the company's mill at Alamo. Thirty men are employed on an average.

The principal work done on the *Rambler* during the year was pushing the long tunnel started last year, which will tap the vein at depth. This tunnel will be nearly a mile in length. A portion of the mine has been working under lease, with good results, and ore to the extent of 850 tons has been taken out.

The *Cinderella* is situated near Three Forks, and has been worked during the year under lease to Messrs. Cory and Foster. They have shipped 170 tons of high-grade silver-lead ore.

The *Antoine* is managed by Mr. George Alexander, who is working a small force, the principal work being development, during which 40 tons of ore have been shipped.

The *Monitor* mine is situated near Three Forks, and has not been worked to any great extent during the year. The management is making preparations to treat the ores from the property on the ground, and has erected large reduction works and a zinc plant at a point on the shore of Slocan lake, and on the line of the Nakusp & Slocan Railway, near Rosebery, where there is good water-power and also good shipping facilities. It is understood that the plant, besides treating *Monitor* ore, will do custom work. Mr. Brockman is president of the company, and Mr. Maurice Gintzburger the local manager, while Mr. Fernau is engineer in charge.

The *Comstock* mine has been working a force of 7 men during the first part of the year, but lately, work has been confined to development with only 4 men, under William Hunter, of Silverton, as manager. Several cars of ore have been shipped.

Work on the *Fisher Maiden* also has been confined to development during the last year, though several cars of ore have been shipped. The property is situated on Four-Mile creek, and managed from Spokane, Washington, with George D. Long as local manager.

The *Mollie Hughes* has been worked on a small scale during the year, under lease to T. Avison, who is also one of the owners. The character of the ore is "dry," and very high in silver values. The ore shipped during the year was 50 tons.

The *Bob Fraction* is owned and operated by the owners, Messrs. Barker and Burges, and is situate on Goat Mountain, near New Denver. The ore is "dry" and high grade. Twenty tons were shipped this season.

The *Capella* is also on Goat Mountain, near the *Bob Fraction*, and is owned and operated by W. R. Will and N. F. McNaught. This is a "dry" ore and valued at $6,000 a car, net.

The *Red Fox* has been worked for the last year, under lease to Gething and Henderson. They have shipped 40 tons of silver-lead ore during the year.

The *Majestic* is situated near the Payne mine, and is worked under lease, with good results, having shipped 35 tons of good ore during the year.

The *Joe Joe* is situated on the north fork of Carpenter creek, and has been operated during the last year under lease, with good results, the ore being "dry" and high grade. The amount of ore shipped was 23 tons.

The *American Boy* is situated near Cody, and is owned and worked by an American syndicate from Spokane. The local manager is Mr. Tom McGuigon, who is working a small force of men. This mine has shipped during the year 40 tons of silver-lead ore.

The *Hewitt* is situated near Silverton, on Four-Mile creek, and is worked under lease by Mr. M. S. Davys, of Nelson, who is shipping a good deal of ore.

The *R. E. Lee* is near Sandon, and is operated by Mr. Lorenzo Alexander, of New Denver, who is also a part owner. Mr. Alexander expects to ship ore as soon as rawhiding begins. He has shipped one car during the year.

The *Mercury*, near the *Payne* mine, has been working a small force for a part of the season by the owners, Messrs. Twigg, Cunning and Drewry, who shipped 14 tons of very rich silver-lead ore.

The *Rowse Fraction* is on the north fork of Carpenter creek, and is owned and operated by Messrs. Hunter and Fairbairn, of Silverton. The ore is "dry," and gives high values in silver. The shipments for the year amounted to 12 tons.

The *Lucky Jim*, near Bear lake, was purchased early in the year by Mr. G. W. Hughes, who is now managing the mine himself. He has shipped 200 tons of silver-lead ore, and has thousands of tons of first-class zinc ore stored at Kaslo with excellent prospects of getting a good market for it.

The *L. H.* is situated on Red mountain, between Silverton and Eight-Mile creek. The owners, Messrs. Fingland and Brand, have done a great deal of development work for the last few years. The principal values in this mine are in gold.

The *Silver Bell* has been worked during the year under lease to Mr. Harry Lowe and others, and is showing up well under development.

The *Marion*, situated on Silver mountain adjoining the *California*, is also worked under lease, and Messrs. Brindle and Thompson have already a car of ore on the dump.

Summing up the situation in the Slocan, and more especially in the "lead belt," the season has, on the whole, been fairly prosperous, especially for lessees and owners of small properties, who have been working on a small scale and shipping their own ores, and a feeling of confidence for the future prevails among all classes who are engaged in the mining industry in the district.

OFFICE STATISTICS—SLOCAN MINING DIVISION.

Free miners' certificates issued—ordinary	389
" " —companies	9
Locations recorded	105
Assessments recorded	368
Cash paid in lieu of work	$615
Transfers and other documents recorded	83
Certificates of improvement recorded	19
Traders' licences issued	34

SLOCAN CITY MINING DIVISION.

REPORT BY H. P. CHRISTIE, MINING RECORDER.*

I have the honour to submit my annual report on the Slocan City Mining Division for the year 1904.

There has been, on the whole, a slight improvement in the mining situation here during the past year, there being an actual improvement in tonnage of ore shipped, of about 80 per cent. over last year, and there are more mines shipping, and more men employed. The general impression, however, seems to be that no great success will attend the mining industry in this division until mills are erected to treat the low-grade ores on the ground. The most notable achievement of the year has been the success of the *Ottawa* mine. Leasing is still popular and has been, in most cases, successful.

SPRINGER CREEK.

The *Arlington* and *Speculator* have practically done nothing, keeping merely a couple of men employed.

Slocan Prince (*Black Prince*) has changed hands, as have also the *Two Friends* and *Bank of England*. This group has been acquired by the Pioneer Mining Co., of Nelson, and is now employing about 25 men. The former lessees shipped about 60 tons and the present owners are to make a large shipment immediately.

The *Ottawa* has been worked steadily all the year, and is now employing about 35 men. This mine has proved an unqualified success, having shipped about 1,300 tons of exceptionally rich ore, averaging, approximately, 200 ozs. in silver to the ton. The mine has already paid for itself and all development to date.

The *Myrtle Group* of claims has been worked all the year by from four to six men. They have driven a cross-cut tunnel of 450 feet, with side-drifts and a raise. By these means they have cut the vein at a vertical depth of about 100 feet. This is probably one of the largest veins in the district.

The *Cripple Stick* has been worked under lease with a small force of men, and a shipment of 10 tons was made.

The *Mayeta Group*, consisting of 15 claims, has been purchased by Pittsburg capitalists. A Crown grant is being applied for, and six men are at work developing the property.

The *Young Bear Group* of four claims has been bonded by a Sandon syndicate, and is undergoing development. They have already exposed a fine body of ore.

The *Tamarac* has recently been leased, and five men are employed taking out ore.

The *Combination* is being worked by three men. They have a good showing, and will shortly make a shipment.

The *Club* has undergone some development, with promising results. A good pack-trail was made and 8 tons of ore shipped.

On the *I.X.L.* and *Northern Light* some work has been done, and the latter will make a shipment shortly.

The *Port Hope* and *Republic* were worked under lease, shipping 17 and 22 tons, respectively. The *Graphic*, *Argentite*, and *Calumet and Hecla* were all worked a little, the latter opening up a fine body of ore.

**See* also Report of Provincial Mineralogist, page 163.

12-MILE CREEK.

The *Colorado* and *Hamilton* made a successful shipment which paid all expenses of driving a 50-foot tunnel. More ore is at present being taken out.

The *Sapphire* worked under lease, and the *Black Fel* by owners, both shipped a small quantity of ore.

TEN-MILE CREEK.

The *Enterprise* had 40 to 50 men working all the summer. About 680 tons were shipped, and at present there is a small force of men opening up new ore-bodies. This property is under lease to W. E. Koch, of Nelson.

The *Edison,* leased, worked a small force and shipped 15 tons.

The *Neepawa* worked under lease with a small force, and shipped three car-loads of ore.

The *Westmont* and *Black Cloud* were worked steadily by owners all the year, and look promising.

The *Riverside,* a new property, has improved under development.

The *Mabou* was worked by the owners with a few men, and a fine body of ore has been exposed, on what is supposed to be the *Enterprise* vein.

The *Highland Light* was worked by the owners, who shipped two tons of very rich ore.

The *Bannockburn* is being worked by five men under a lease.

LEMON CREEK.

There has been some activity on this creek during the year, the *Chapleau* having been leased and worked with good results. There are now about 28 men employed on this property, and it is looking most promising. Former lessees shipped three tons of concentrates, and present lessees have one car of gold ore and one car of concentrates ready for shipment.

The *Kilo* has undergone some development, and sent out a car of good ore, which gave returns of $64 a ton in gold. Another car is ready for shipment.

The *Alberta* was worked under lease with three men, and shipped 15 tons.

The *Emmett Group* is leased, and will ship ore during the winter.

On the *Nansen* four men were employed taking out ore. Several car-loads will be shipped during the winter.

The *Blandfield,* worked by owner, made a small shipment and has another going forward.

The *Lady Franklin* is being opened up by owners, and will make a shipment in the spring.

OFFICE STATISTICS—SLOCAN CITY MINING DIVISION.

Free miners' certificates issued	188
Certificates of work recorded	317
New locations "	107
Conveyances "	77
Crown grants issued	15

ROSSLAND DISTRICT.

TRAIL CREEK MINING DIVISION.

Report of J. Kirkup, Gold Commissioner.

I have the honour to submit my report of mining operations in the Trail Creek Mining Division during the year 1904.

Although the shipments of ore from this Division for the past year are somewhat short of those of the previous year, the mineral industry has witnessed a general and satisfactory progress, as the future of the camp depends to a large extent on the successful concentration of the ores, and the year 1904 has witnessed a marked advancement in the way of solving this problem, four concentration plants having been in operation during the latter part of the year.

The *Le Roi No. 2* concentrator, which was the first to be erected in the camp, has been in operation during the whole of the year, with but little interruption, although during the past few months the mill has been operated by the water process of concentration only, and fairly good results have been obtained.

During the year the Consolidated White Bear Mining Company, Ltd., constructed an Elmore plant of much larger dimensions than that of the *Le Roi No. 2*, including many labour-saving devices; and although this plant has been in operation but a few weeks, the results are quite satisfactory.

The Velvet-Portland Mining Company also constructed a small plant on their property on Sophia mountain, in which straight water concentration is used, and, so far as known, with satisfactory results.

The mill of the Rossland Power Company, recently completed, after a trial run of several weeks, closed down early in December, for the purpose of adding some necessary machinery.

The statistics of ore production for the year show that about 312,205 gross tons of ore have been shipped from the mines within this Division, the gross value of which is approximately $3,860,354. The ore shipments from the different mines for the year 1904 are, approximately, as follows:—

Le Roi	132,496	dry tons.
Centre Star	76,191	"
War Eagle	56,760	"
Le Roi No. 2	22,947	"
* " "	661	
Jumbo	13,298	"
Rossland-Kootenay	5,068	"
†White Bear	1,344	
Spitzee	1,000	"
*Velvet-Portland	180	
Cliff	1,517	"
‡I.X.L.	600	
View	68	"
Miscellaneous	75	"
	312,205	"

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*Concentrates. †Including concentrates. ‡Milled.

NOTE.—The foregoing shipments from the *Centre Star* and *War Eagle* mines do not include some 10,000 tons of second-class ore shipped to the Rossland Power Company's concentrator, and from which no returns have been received.

DETAILED STATEMENT.

Le Roi Mining Company, Limited.—Le Roi Mine.

Tons of ore shipped (dry)	132,496	
Average number of men employed	243	
Development:		
Drives	3,078.5	feet.
Raises	240.5	„
Cross-cuts	2,030	„
Winzes	122	„
Diamond drilling	3,938	„

Additions to plant during the year, stating approximate value of same, $7,000.

The Centre Star Mining Company, Limited.—Centre Star Mine.

Tons of ore shipped (dry)	76,191	
Average number of men employed	160	
Development:		
Drifting Cross-cutting Tunnels	2,412	feet.
Raises	201	„

No additions to plant during year.

The War Eagle Consolidated Mining and Development Company, Limited.—War Eagle Mine.

Tons of ore shipped (dry)	56,760	
Average number of men employed	125	
Development:		
Drifting Cross-cutting Tunnels	1,938	feet.
Raises	106	„
Winzes	175.5	„

No additions to plant during year.

Le Roi No. 2, Limited.—Josie, etc., Mines.

Tons of ore shipped (dry)	22,947	
Tons of concentrates shipped	661	
Average number of men employed	120	
Development:		
Drives	1,423	feet.
Raises	92	„
Cross-cuts	157	„
Diamond drilling	3,376	„
Winzes	105	„

No additions to plant during year.

Jumbo Gold Mining Company, Limited.—Jumbo Mine.

Tons of ore shipped (dry)	13,298	
Average number of men employed	20	
Development:		
Raises	60	feet.
Tunnels	407	„

Additions to plant during year consisted of one 8-drill compressor and motor, of the value of $5,000.

Consolidated White Bear Mining Company, Limited.—White Bear Mine.

Tons of ore shipped (including concentrates)	1,344
Average number of men employed	40
Development:	
Drives	250 feet.

Addition to plant during the year consisted of the construction of an Elmore Process concentrator, of the approximate value of $80,000.

Spitzee Mines, Limited.—Spitzee Mine.

Tons of ore shipped (dry)	1,000
Average number of men employed	16
Development:	
Drives	500 feet.
Raises	400 "
Cross-cuts	100 "
Winzes	30 "

Additions to plant during year consisted of one electric pump and motor of the approximate value of $1,500.

Velvet-Portland Mines, Limited.—Velvet, etc., Mines.

Tons of concentrates shipped	180
Average number of men employed	15
Development:	
Drives	694 feet.
Raises	60 "
Cross-cuts	8 "

Addition to plant during year consisted of the construction of a concentrator, of the approximate value of $25,000.

Columbia-Kootenay.

This property was operated by the Rossland-Kootenay Mining Company, the owners thereof, from January 1st to July 31st, the work consisting of stoping some 5,068 tons of ore, 32 men being employed.

Cliff.

This property was worked for a short time during the past season, during which time 1,517 tons of ore were shipped.

I.X.L.

This property was operated under a lease for some time during the past season, during which time some 600 tons of ore were put through the *O. K.* mill, at a loss to the lessee.

View.

This property was also operated under a lease for a short time during the past season, during which time some 68 tons of ore were shipped.

In addition to the foregoing, some miscellaneous shipments amounting to possibly 75 tons were made, of which no accurate returns have been received.

Outside of the companies whose work is here set forth in detail, little has been done in the camp beyond the ordinary assessment work, and that has fallen off to a large degree in comparison with former years.

OFFICE STATISTICS—TRAIL CREEK MINING DIVISION.

Mineral claims recorded	50
Placer " "	6
Certificates of work	75
Payments in lieu of work	2
Certificates of improvement	4
Bills of sale, etc., recorded	24
Water grants issued	1
Free miners' certificates:	
Companies	9
Personal	357
Special	3

BOUNDARY DISTRICT.

GREENWOOD MINING DIVISION.

Report of W. G. McMynn, Gold Commissioner.

I have the honour to submit my annual report of operations in the Greenwood Mining Division during the year 1904.

It is by no means complete, as it has been found very difficult to obtain from some of the companies and individuals operating the working properties any idea at all of what has been done during the year, but where figures are used they may be taken to be those furnished by the owners or others in authority. The principal features of the year have been the steady increase in the number of high-grade gold and silver-bearing properties in the immediate vicinity of Greenwood, all of which, so far, have proved to be successful, and the resumption of work by the reconstructed Montreal & Boston Consolidated Mining & Smelting Company. This company, besides taking over the property of the Montreal & Boston Copper Company, has acquired the interests of the Dominion Copper Company, and a number of claims, belonging to individuals, which were in an advanced state of development. There are now in this Mining Division 13 properties at work and two smelters, employing in the neighbourhood of 1,000 men continuously. As usual, there has been a small amount of placer mining both by whites and Chinese, but no returns are available of the amount of gold produced, but it must be small.

It is confidently expected that the output for 1905 will reach 1,000,000 tons of ore. Last year the output for the district reached nearly 820,000 tons.

As in former years, by far the larger part of the ore produced came from the *Granby* mines, with the *Mother Lode* next, these two being together credited with about 708,000 tons. The details of production have not been supplied, notwithstanding the efforts made to secure the tonnage direct from the companies shipping. Most of the figures that follow, have, therefore, been approximated or taken from published tables. Where there are discrepancies they are caused by different tonnage having been supplied by the mines concerned, but in the main they are substantially correct. The following is the approximate tonnage of the various shipping mines:—

	Tons.
Granby	549,703
Mother Lode	175,800
Emma	38,000
Brooklyn and Stemwinder	24,000
Oro Denoro	15,000
Athelstan-Jackpot	4,600
Senator	3,500
Sunset	2,800
Mountain Rose	1,800
Sundry small shippers	2,500
Total	817,703

GREENWOOD CAMP.

Granby.

The report of development for the year is that 2,327 feet of sinking and raising, and 3,456 feet of cross-cutting, were done; total 5,783 feet. The total footage to date is 21,061 lin. feet, about five miles of underground workings, to say nothing of stopes of immense size and enormous excavations in the quarries of these mines. With a record output of about 1,549,594 tons to date, extensive workings at these mines may well be looked for. The information supplied from the mine does not give particulars of new plant and machinery installed, but it is known that new ore-bins were built, to meet requirements of the Great Northern Railway company's connection of its system with No. 3 tunnel, and that this tunnel is being equipped in readiness to send out a large tonnage of ore to the smelter over the new railway. Hauling from the tunnel will be by an electric locomotive, which should by now be at the mine. No. 4 tunnel will be similarly prepared for delivering ore to the same railway. A second big crusher has been obtained for use here. Like the other installed some time ago, it was supplied by the Jenckes Machine Co., of Sherbrooke, Quebec. Its nominal capacity is 150 tons per hour, the size of its jaw-opening, 42 by 30 inches, and its total weight, 113,000 lbs. Its frame is of semi-steel, having a tensile strength of 32,000 lbs. to the square inch. About 350 men are employed at these mines, which are steadily enlarging their producing capacity, already considerably beyond the present requirements of the company's smelting works.

New machinery installed during two years includes two Canadian Rand, class D, cross-compound, duplex air compressors, electrically driven and connected to motors by rope drives; high-pressure cylinders 16 by 36 inches, low-pressure cylinders 28 by 36 inches, rated capacity together, 8,228 cubic feet of free air per minute, or 60 3½-inch machine drills; two 700 horse-power, type C, Westinghouse induction motors, to operate compressors; one type No. 1 Thew automatic, single-truck, steam shovel, rated capacity 500 to 750 cubic yards in 10 hours, built by the Thew Automatic Shovel Co., of Lorain, Ohio; one type No. 3 automatic, single-truck steam shovel, capacity 1,000 to 1,500 cubic yards in 10 hours, and two 9 by 14 saddle tank locomotives, built by the Davenport Machine Works, Davenport, Iowa, for hauiing the mine ore-cars from the workings to the ore bins.

This machinery has cost the company something like $150,000 alone, and is constantly being added to. It is all of the most modern and approved manufacture, and calculated to materially assist in the reduction of costs in the production of ore.

In addition to the above, last fall new ore bunkers were constructed for the No. 3 tunnel, capacity 2,500 tons, and electrical equipment for hauling ore, including the first electric locomotive in the Boundary, has been ordered and is now being installed. All of this electrical machinery was supplied by the Canadian Westinghouse Co., of Hamilton, Ont., and is of the latest and most improved type. A huge style B Blake-Farrell ore-crusher is also being installed for the No. 3 ore bins, similar to that in use for some time at the No. 1 ore-bins, having jaws opening 42 by 32 inches, and a capacity for crushing rock to the size of 7 or 8 inches at the rate of 150 tons per hour. A crusher-house and ore-bins of 2,000 tons capacity have been built, and a tramway 800 feet long between crusher-house and ore-bins.

In regard to the tonnage of ore treated at the Granby smelter since the first furnace was started, August 21, 1900, the following figures tell the story, the ore all coming from the company's Phoenix mines, with the exception of occasional small shipments from other Boundary, Kootenay and Republic camp mines :—

	Tons.
1900	62,387
1901	230,828
1902	312,340
1903	401,921
1904 (estimated)	578,000
Grand total	1,585,476

For the fiscal year ending June 30, 1904, the production of gold, silver and copper at the Granby smelter was as follows, the figures given being official:—

Copper	16,024,415	lbs.
Silver	275,960	oz.
Gold	54,231	oz.
Mine development	5,783	lineal feet.
Granby ore shipped to smelter	549,703	dry tons.
Granby ore smelted	516,059	"
Foreign ore smelted	36,182	"
Foreign matte treated	4,290	"

Montreal and Boston Mines.

This company last summer arranged to consolidate the Dominion Copper Co.'s *Brooklyn-Stemwinder* and *Rawhide* mines, *Athelstan-Jackpot* mine, *Sunset Group* and *Morrison* mine. With the exception of the last mentioned all these several properties are now on the list of shippers, sending their ores to the company's smelter at Boundary Falls. The *Brooklyn-Stemwinder* has been equipped with new machinery and plant equal to handling 600 tons of ore a day, and they are now producing about 400 tons. Ore-bins, tramways, and other surface works have been constructed, and altogether these properties are in condition to regularly maintain the output required from them to keep the smelter supplied. The *Rawhide* lately commenced shipping and will soon be producing about 300 tons daily. The company has expended many thousands of dollars on this property during the last six months, providing it with machinery, building gravity trams capable of handling up to 600 tons a day, and generally putting the mine into shape for dealing with the large tonnage of ore it has in sight.

For nearly three years, however, the properties have been idle up to last summer, when they were taken over by the Montreal & Boston Consolidated. Since that time they have been most vigourously operated, and in the short time that shipping operations were conducted, to January, 1905, the group had sent to the company's Boundary Falls smelter between 25,000 and 30,000 tons of ore. In addition to this, the Dominion Copper Co., which did not sell the dumps of the *Brooklyn* and *Stemwinder* mines, have shipped approximately 5,000 tons of ore.

Development on the *Brooklyn* has attained a depth of 350 feet in the incline shaft. On the 250-foot level there is a drift about 1,800 feet in length, all of which is said to be in ore of a good grade. At the 150-foot level, a considerable amount of drifting has also been done on the ore-body.

When the Montreal & Boston Consolidated took hold of the *Brooklyn*, in July, 1904, they found it necessary to straighten out and re-timber the shaft, in order to admit the skips. This was done, ore-pockets and runways put in, and since then the mine has maintained, and is still maintaining, a steady output of about 300 tons of ore daily. Some of the stopes in the *Brooklyn* are 50 feet across.

Within the last month or two a new air compressor has been installed at the *Brooklyn*, being one half of a 20-drill machine, of the latest type. This, however, has not proved sufficient to furnish power for pumping, hoisting and operating drills for the *Brooklyn* and *Stemwinder* together, and the other half of the compressor, it is said, will soon be ordered. An 80 horse-power hoisting engine is in use at the shaft of the *Brooklyn*.

The *Stemwinder* mine, almost adjoining the *Brooklyn*, has an incline shaft down nearly 400 feet. The only drifting that has been done in this mine is at the 114-foot level, but the ore taken out is some of the best from any mine in the Boundary. In fact, in the early days of the Boundary, before the *Granby* mines, the *Mother Lode* and the *Brooklyn* had had as much development and shipping as they have now, the *Stemwinder* was commonly reputed to be the best mine in this district.

Across the valley from the *Brooklyn* is the *Idaho* claim, which has a tremendous surface showing, and has had some development done. The *Brooklyn* workings extend into the *Idaho*, and in the course of time the *Idaho* will doubtless be one of the big shippers of the group.

The *Sunset* mine, in Deadwood camp, is owned by the Montreal & Boston Consolidated, and has only been operated since that company resumed operations in the Boundary. The mine is well equipped with machinery, and this year has shipped appoximately 5,000 tons.

SKYLARK CAMP.

The *Skylark Group*, consisting of the *Skylark* and *Denver* mineral claims, is situated about half way between Phoenix and Greenwood, B. C. These claims were discovered in 1892 and were worked for some time with very good results. Later, however, owing to the drop in the price of silver and to the excessive cost of transportation, it was found necessary to discontinue work on this group, as well as on all other high-grade properties in this part of the Boundary.

The underground work consists of the following :—A shaft, dipping to the east at about 55° from the horizontal, follows the vein to a depth of 80 feet. At this point the vein faults to the east about 30 feet. It was easily picked up again by a cross-cut, and a winze has been sunk on it for another 20 feet. This winze will be sunk 50 feet more as soon as possible. On the 80-foot level a drift has been run on the ledge for a distance of over 250 feet. This drift will be carried north and south as fast as possible.

The ledge itself runs nearly north and south and dips to the east. It is very regular and varies in width from a few inches to over a foot. It carries a great deal of antimonial silver and native silver. The ore is easily mined, as the walls are exceptionally good and the ore is not frozen to them in the least.

During October, 1904, the number of men working on the *Skylark*, under Foreman Rowe, was six. On November 1st the force was increased to eleven, which force is still working. As stated before, it took over a month to get ready to mine, so that no ore was shipped until November 25th, 1904. From that time to the present (January 1st, 1905) three cars have gone out, one of first-class ore, one of second-class ore, and one of third-class ore, making a total of 52 tons shipped. These three cars brought in $4,970. The total expenses during the three months for wages, machinery, buildings, etc., was $3,900. At the present time there is ready to ship a car of second-class ore and about ten tons of first-class ore. This will easily net $2,000.

Barbara.

The *Barbara*, separated from the *Helen* by one claim, was acquired last summer by Chicago parties and is now being developed. It lies directly east of Greenwood, its west line abutting on Copper street. A vein from 17 to 26 inches in width, constituting one of the biggest quartz leads in the camp, crosses this property in a northerly and southerly direction and traverses other adjacent claims. Its trend is north and south. The lode had thus the same characteristic strike and dip of all the parallel veins so far discovered and opened up in the south belt. The mineralisation closely resembles that of the *Helen*, from which it is separated by one claim; and also that of the *E. P. U.*

An incline shaft on the lead extends 40 feet to the first level, where the vein was found to have broken over, but the vein has been exposed and stripped clean for a distance of 200 feet on each side of the shaft. Ore taken from the galena outcrop gave an average assay of $78.60 per ton in gold, silver and lead. The *Barbara* vein is a parallel lead to the veins on the *E. P. U.* and *Goldfinch* mines. The *Barbara* claim adjoins the *Goldfinch* mine on the west.

Helen. The *Helen* is situated on the east side of Boundary creek, adjoining Greenwood on the south and Anaconda on the east. In an air-line, the Greenwood smelter is 1,500 feet distant from the mine workings. The property was bonded last March by local parties and the work has proceeded under the direction of W. H. Jeffery, M.E. At various periods in the past different individuals had thrown up bonds on the *Helen*, owing to their failure to obtain uniform values and the discouraging difficulties presented at the bottom of a 40-foot shaft, where the lead virtually pinched out. The best assays which have been obtained from the pay streaks varied from $2 to $20 and $30 per ton in gold and silver. The parties now holding the bond, however, have had exceptional success. By cross-cutting and following a horizontal seam an inch wide from the fault at the bottom of the shaft to a point 40 feet east, the lead was again recovered at its natural size on its original dip, at an angle of 50° to the east, the strike being northerly and southerly. Concurrently, a drift was run south 29 feet on the vein above the fault on the same level.

At a point 19 feet south of the shaft a series of samples gave average values of $115 per ton in gold and silver, the former predominating. Ten feet farther south, on the same lead, just above the fault, another series of samples gave average values of $225 per ton in gold and silver in the same order. One sample ran $525 per ton. The drift has been extended farther south and raises have been made in the same direction at the same time, in order to extract this high-grade ore.

From the point in the 40-foot cross-cut where the ledge was re-discovered this incline shaft was sunk 50 feet on the ore. This working will be extended to a depth of 200 feet, with drifts north and south on the vein at intervals of 50 feet. Now that the difficulties presented by the fault have been overcome, the ledge has been found in place stronger than ever.

The silver-gold mines about Greenwood attracted attention throughout the year. Beyond stating that the *Providence*, *Elkhorn* and *E. P. U.* continue to ship ore, and by development work made it evident that their rich quartz veins go down, there is not much to state. The output of these three mines was about 1,400 tons. The ore runs from $50 to $100 per ton, in carload lots. A discovery was made a few weeks ago on the *Providence* of ore close to the surface, and this lead was stripped along a distance of about 215 feet. It is thought by some to be an extension of the vein that has been worked during two years past.

The banner property in this class is the *Providence*, the history of which is well known, having been a profitable undertaking for three years, and now looking as well as ever. Some $22,000 in dividends has been paid to the shareholders in this property, with the almost certainty of their getting many more dividends.

The *Elkhorn*, adjoining the *Providence*, owned by Phil McDonald and James Sutherland, has paid from the grass-roots, and is paying handsomely now. In the same locality are the *Gold Bug*, *Strathmore*, *Combination* and others, that so far are coming up to expectations These claims are all located north of Greenwood within a mile or two.

SMITH'S CAMP.

Republic Group. The development work carried on at the *Republic Group*, in Smith's camp, since last September, in order to secure a series of shipping tests, has resulted very satisfactorily. The quantity of ore exposed on three of the properties, the permanence and continuity of the leads, coupled with the smelter returns, all combine to demonstrate that the Boundary is about to add another producer to its growing list of high-grade propositions.

The *Republic Group* comprises the *Last Chance*, *Republic*, *None Such* and *Hidden Treasure* mineral claims, situate in Smith's camp, one mile west of the Montreal & Boston Copper Co.'s smelter at Boundary Falls. It is owned by the Republic Gold Mines, Ltd., of which W. T. Smith, a pioneer of the district, is the general manager. Mr. Smith has just received the smelter returns of a recent carload shipment of 20 tons of ore from the *Last Chance* claim. The ore was treated at the Hall Mines smelter, Nelson, B.C. The carload, according to the official certificate, averaged 18⅝ per cent. lead, $3 gold, and 22 ozs. silver, equivalent to $23.40 per ton, including the lead bounty.

The *None Such* claim also made a similar carload shipment, which averaged $10 gold and 2 oz. silver per ton. The vein occurs in the same formation and averages from three to five feet in width. It is the same lead as the one on the *Last Chance*, the adjoining claim.

The carload shipment from the *Republic* claim proved even higher, the ore averaging $17 gold and 7½ ozs. silver per ton. The vein runs at right angles to the other lead and is from 12 to 18 inches in width. It occurs in identical formation.

DEADWOOD CAMP.

Mother Lode.

At the B. C. Copper Company's *Mother Lode* mine, substantial progress was made last year. The open workings were considerably enlarged—in fact they are now one big quarry, the dividing masses of ore having been broken down and sent to the smelter. There is here a long, double-tracked adit, known as the mule tunnel, from which half a dozen raises have been made to the quarries above. Near the end of this tunnel, a big stope was opened a few months ago in a large body of ore of a good grade. This ore may prove to be the same body as that in No. 5 quarry, but this cannot be determined until the raise, now being made, shall break through. When the mine was visited, about the middle of November, this raise was up about 150 feet, in ore most of the way, but there remained about 50 feet more to be passed through before the connection would be made. The consolidation of the crushing plants having been decided upon, a new tunnel was driven, to intersect the main shaft, from which the 200-foot and 300-foot levels were opened, on the same level as the quarry tunnel. At the shaft a large pocket has been excavated, and this will discharge the 4 to 5-ton skips, obtained to replace the cages previously used. The skips will empty into a bin at the head of the shaft, the ore passing thence to either one of a pair of Jenckes-Farrell crushers, each having a jaw-opening of 24 by 36 inches. These crushers will be worked by two engines, driven by compressed air, so arranged that either engine can drive either crusher, thus reducing chances of stoppages by break-downs in either engines or crushers. A belt conveyor will take the crushed ore to the main ore-bins for shipment by rail, thence to the company's smelter at Greenwood. All the plant for this improved arrangement for crushing the ore has been purchased and some of it has already been installed. Where the excavation was made for the crushers a body of good ore was opened up and from this 6,000 to 7,000 tons were taken out. This body of ore has since been proved to be of considerable size, recent reports placing its dimensions, so far as yet explored, at 200 feet by 130 feet. The diamond drill has been used underground during recent months, with satisfactory results, one hole proving the occurrence of very good magnetic oxide ore down to 345 feet below the collar of the shaft, at which depth the drill was withdrawn.

In some respects the *Mother Lode* is fairly representative of the larger copper-gold ore deposits occurring in the Boundary district. The croppings are in places soft oxides of iron from decomposition of ore-bearing rock, and in others unaltered magnetic iron oxides, very solid and compact, carrying copper pyrites and gold. In still other places they are calcite with copper pyrites, iron pyrites, more or less quartzose material, and carrying some gold. These croppings differ from those on the Granby Co.'s *Knob Hill* mine, in which specular iron occurs, a fine-grained magnetite being more generally characteristic of the *Mother Lode* outcrops, the chief of which was a big copper-stained blow-out, standing out prominently and distinctly noticeable from all of the surrounding thinly-timbered hills.

The footwall, as disclosed by development work, is for the most part limestone, and the hanging-wall a diabase. On the footwall side there is not, as a rule, a marked transition from ore-bearing or barren rock, but the ore often grades into the country rock outside of what is more or less defined as the ore-body, so that it is difficult to tell within a few feet where the pay ore will run out. On the other hand, the ore gives place to the barren country rock on the hanging-wall side with comparative abruptness, fading away completely within a foot or two. The chemical composition of the hanging-wall and of the ore lying against it—leaving out the pyrites—is substantially the same. According to the best geological authorities who have examined the district, the ore-bodies are altered limestone. Here, as at the *Old Ironsides*, *Knob Hill* and *B. C.*, porphyry dykes intrude, and it is considered quite probable that these intrusions afforded means of ingress for the ore-carrying solutions from beneath; consequently, the presence of a porphyry dyke is usually regarded in this district as a favourable indication when prospecting for ore.

Although the croppings on the *Mother Lode* appear in somewhat of a crescent shape, the general trend of the lead or ore deposit is north and south. The ore-bodies pitch to the east at an angle of 55 to 65°. The ores themselves may be classed in three general groups:—1. A calcite carrying copper pyrites and iron pyrites, these sulphides sometimes being massive and sometimes scattered in small crystals throughout the rock. Some quartzite is also often present. 2. A silicate of lime, iron magnesia and alumina, carrying both copper and iron pyrites, massive or scattered, and frequently also quartz, garnets or serpentine; often all three together. Occasionally, too, a small quantity of zinc blende occurs in this class of ore. 3. An excessively hard magnetic oxide of iron, with silica and copper pyrites; not often much iron pyrites.

For several years development work was done underground, and much cross-cutting and drifting at the 200 and 300-foot levels has proved that here, too, a large body of ore of shipping grade is available.

A main tunnel has been driven nearly a thousand feet into the hill, on a level with a bench on which have been erected ore-bins and other facilities for ore shipping. From this tunnel several exploratory cross-cuts have been run to determine the width of the ore, and big raises have been made to the quarries above. The main quarry was opened at a level about 110 feet above that of the tunnel, and other quarries below and above. From the highest point at which the ore outcrops on the hill, down to the level of the main tunnel, the depth is about 260 feet, and down to the bottom of the main shaft, which is also in ore, about 350 feet. Half a dozen quarries have been opened at different places, those on the top of the hill giving a larger percentage of sulphur, which facilitates matte-making in the smelter furnaces. The raises from the tunnels to the quarries are funnel-shaped at the top, so that when blasted down from the faces of the quarries, the ore may fall into them without handling. Rocks too large to pass through the bin gates of the hoppers at the bottom of the chutes are "bulldozed." The ore is drawn from the chutes into 3-ton cars, which are hauled by horses to ore-crushers having each a capacity of 65 to 80 tons of rock an hour, crushing to a size not exceeding five inches. From the crusher an elevating machine raises the ore to shipping bins above the railway track.

The *Mother Lode* is opened up sufficiently to enable it to maintain an output up to 1,000 tons per diem, whenever the company shall increase the treatment capacity of its smelter to require that quantity in addition to the custom ores which it also treats.

WEST FORK OF KETTLE RIVER.

Development in this district is slow, owing to the absence of transportation. In 1904, however, there was more work done than for several previous years.

On Wallace mountain, the *Sally* claim last winter and spring shipped three carloads of ore to Midway by sleighs. The ore was galena and gray copper, and contained much silver, which occurred in the native form. The values averaged considerably more than $100 a ton, one car running over $125 a ton. A lot of second-class ore was also got out, but this cannot be shipped under the existing conditions, freight and treatment costs amounting to nearly $30 per ton. Five men are at present engaged in development, and more will be put on as soon as sufficient snow falls to admit of shipment of ore.

The *Wellington*, also on Wallace mountain, has lately been leased, and three men are now at work on it. The ledge is an extension of that on which the work has been done at the *Sally*. There is a good showing of ore in the face of a drift at the 40-foot level. On an adjoining fraction about 100 feet of tunnelling has been run to cross-cut a strong ledge of high-grade ore showing on the surface.

On the *Bounty*, a tunnel driven 100 feet taps the ledge. This property will also ship this winter, the ore being of an exceptionally high grade.

On the *Gold Drop Fraction* a tunnel is in about 20 feet. The ore on this claim carries good values in gold. A good deal of work has also been done on the *Gold Drop*, on which there is a high-grade silver ledge.

On the *Napanee Group*, situated about two miles from Wallace mountain, several men were at work all last summer. Two ledges have been opened up, and the ore assays up to $40 to the ton in gold, which is associated with arsenical iron.

On the *Curry Group*, on Curry creek, more than 100 feet of work was done in 1904, and several ledges were worked on. On Beaver creek, considerable development work was done on some claims in St. John camp. This is a copper-gold camp, with large bodies of low-grade ore. The results of the work have been very promising.

There has also been a great deal of assessment work done throughout the district.

A small test mill, with two Tremaine stamps and an Overstrom table, was installed at the *Carmi* mine last year. The mine had not been worked for some time, but it was known to have a good grade of ore, for between 800 and 900 tons were shipped to a Boundary smelter, and its value in bulk ascertained. The experiments now being made to concentrate the ore are for the purpose of lessening the heavy cost of the 50-mile haul to the railway at Midway. The extraction obtained is 87 per cent., of which 30 per cent. is by amalgamation. The concentration is 6 into 1. Water will be brought in next spring for power purposes, and additional plant installed.

The *Butcher Boy* is the extension of the *Carmi* on the west. A shaft has been sunk 75 feet with drifts at 45 and 70-foot levels. The ore is free-milling and concentrating. About 50 tons were taken out lately, and of this quantity some 20 tons will be shipped. Values range from $50 to $10. A small mill may be put in next spring.

There is a small high-grade silver ledge on the *Observatory Group*, from which two or three cars will probably be shipped this winter. Numbers of other claims in the *Carmi* camp have promising showings and some of these are being prospected.

THE BOUNDARY SMELTERS.

SMELTER OF THE B. C. COPPER CO., AT GREENWOOD.

The British Columbia Copper Co.'s smelting works, at Greenwood, Boundary District, were designed and constructed in 1899-1900 by Mr. Paul Johnson, E.M. They were planned with a view to eventual enlargement to a maximum treatment capacity of about 1,800 tons per diem. Their present capacity, with two furnaces running, is between 700 and 800 tons of ore a day. The first furnace was blown in on February 17th, 1901; the second was completed in the earlier half of 1902. Recently a Bessemerizing plant was added, this having been designed and installed by the present smelter superintendent, Mr. J. E. McAllister.

The smelter site adjoins the town of Greenwood. The Canadian Pacific Company's Columbia and Western Railway to Midway, giving rail connection with Rossland, Trail and Nelson, runs just below the works, while the Deadwood branch of the same system passes immediately above. Connecting tracks have been constructed at three levels—a double track over the upper ore bins, for the delivery of ore to be passed through the sample mill; a triple track over the smelter mixture bins and above the fuel yard, and a single track below the converter building, this last for the delivery of stores and shipment of the copper product.

The works may be briefly described as follows:—Starting from the top, the upper ore bins come first. There are six of these, each of 500 tons capacity, built in two parallel rows. An elevated tramway connects these with the sample mill building, which is a three-story frame structure 79 by 65 and 58 feet high to the eaves. Its full capacity when it shall be supplied with the requisite ore bins, etc., will be about 3,000 tons, but present arrangements only include provision for a smaller quantity. The building is large enough for three sets of sampling and crushing plant, but as yet only one set has been put in. This comprises three Gates rock crushers of different sizes, one pair Cornish rolls, one sample grinder, and three automatic samplers. The sample mill has been constructed on the automatic principle with samplers designed to avoid elevating the material before crushing. Under these arrangements only two or four per cent., as desired, has to be elevated, the great bulk going to the discard bins. The lowest floor of the sample mill building is two feet higher than the top of the lower or smelter mixture ore-bins. There are two sets of these bins, each twelve in number in four parallel rows, the whole giving a storage capacity of about 10,000 tons. They are crossed by three parallel railway tracks over which the bulk of the ore from the company's *Mother Lode* mine, already crushed at the mine and consequently not having to be passed through the smelter sample mill, comes to be dumped direct into the lower bins.

The flue dust-chamber is 12 feet wide by 14 feet high, and its length is about 620 feet. It has thick masonry walls, brick-lined in part and arched over with brick. It rises 76 feet 6 inches to the base of a circular brick stack, 121 feet high, the inside diameter of the shaft being 12 feet. This, together with the height gained by running the flue up the hillside, gives an effective draught height of 197 feet 6 inches from the level of the blast furnace charging floor to top of stack. This brick stack was erected last year, replacing the sheet steel stack that previously carried off the fumes from the blast furnaces.

The lower part of the blast furnace house is constructed entirely of stone work and steel, and the charging floor is of cast iron plates. The building is 58 feet wide by 45 feet long, and room has been left for extending it sufficiently to accommodate three more furnaces. The furnaces are water-jacketed stack furnaces 42 inches wide by 150 inches long, inside dimensions at tuyeres, of which there are ten on each side of 3½ in. diameter.

Owing to the filling of the dumping ground suitable for that purpose it became necessary to abandon the practice of granulating the slag from the furnaces, so last autumn a movable slag railway was constructed. The slag is now taken from the blast furnaces in a molten state in large, side-dumping pots, tilted by a worm and worm-wheel, each pot having a holding capacity of five tons. They are hauled by a steam locomotive with 10 by 14 cylinders, and four drivers of 31 inches diameter.

The engine and blower-house, 60 feet by 45 feet, contains two No. 7½ Connersville blowers, the high-pressure cylinder of a compound condensing Reynolds-Corliss engine 16 by 35 inches, rated at 150 h. p. with 100 lbs. steam pressure, and an electric light dynamo with direct-connected engine. In the adjoining 45 ft. by 40 ft. boiler room there are three horizontal return tubular boilers 66 inches by 16 feet, each of 100 h. p. and equal to a steam pressure of 130 lbs. Space was left for housing more boilers, but as electric power has been substituted for steam power throughout the works, the earlier intention to double the steam power will not now be carried out.

A Bessemerizing plant has been installed and the product now turned out is 99 per cent. blister copper instead of 45 per cent. copper matte as formerly. This plant consists of two converting stands, equipped with five shells of the trough type, 84 inches in diameter and 126 inches long. The converters are tilted by power supplied by a hydraulic accumulator.

For the purpose of conveying the molten matte from the blast furnaces to the converters, and for moving the shells from their stands to the re-lining platform, an electric travelling crane is used. Four motors operate this crane, which is equipped with a main hoist of 40 tons capacity and an auxiliary hoist of 10 tons.

The fumes from the converters are taken off by an independent stack, having first passed through steel boxes at the back of the stands, a suitably-shaped steel flue of 20 square feet cross-section, and finally a brick chamber of 285 square feet cross-section, in order to collect the flue dust, before being conducted into the stack.

The converting plant is housed in a steel building, 46 feet by 90 feet with a lean-to of 60 feet by 30 feet. At one end of this building is located the re-lining machinery. The silicious ore used for the linings passes directly from the sampling mill through a 7 by 10 inch Blake crusher, and a set of 24-inch rolls, into a bin, from which chutes lead to a 6-foot Carlin mixing pan. The clay used as a bond for the silicious ore of the lining is delivered by similar means into the pan which automatically discharges the mixed product, ready for tamping, in front of the converter shell.

The blast for the converters is furnished by a Nordberg blowing engine, with cylinder 40 in. diameter and 42 in. stroke, having a capacity of 5,000 cubic feet of air per minute, at 12 lbs. pressure. This compressor is operated by a rope drive, the fly-wheel being 18 feet in diameter and power furnished by a 300 h. p. variables peed motor, operating at 2,000 volts.

For the transmission of electricity the B. C. Copper Company has built a pole line, with two independent three-phase circuits, to connect with the sub-station of the Cascade Water Power & Light Co., at Phœnix, a distance of 4$\frac{8}{10}$ miles. This line terminates in a brick sub-station containing step-down transformers from 20,000 to 2,000 volts of 1,000 h. p. capacity. From this sub-station the alternating current is transmitted at 2,000 volts to the power house, in which are located transformers with a further step-down to 550 volts.

A 75-k.w motor generator furnishes the direct current required for travelling crane and the necessary power for trolley locomotives to be used in the immediate future; a 300 h. p. motor, previously referred to, drives the Nordberg compressor; there are two 100 h. p. motors for the two blast furnace rotary blowers and one for the sample mill; a 40 h. p. motor drives the converter lining machinery; a 20 h. p. motor operates the hydraulic accumulator for tilting the converters; a 15 h. p. motor runs elevators connecting the blast furnace tapping and charging floors, and a 5 h. p. motor the sample grinding machinery. The lighting on the plant and premises is provided for by a series of transformers, each having a capacity of 150 lamps.

A briquetting plant, of a capacity of 100 tons a day, is to be at once installed to handle the flue dust and concentrates. This will consist of a mould briquetting press with lime slackers, mixers and conveyor belt, the flue dust being automatically fed from a bucket elevator. This plant will be operated by a 40 h. p. induction motor.

Prior to the installation of the above described Bessemerizing plant the copper matte produced at this smelter had to be sent elsewhere to be converted into blister copper. Now this work is done on the spot, and in making provision for it the B. C. Copper Company has advanced another stage in the progressive policy it is steadily pursuing. The total tonnage of ore treated at this smelter during the three years and a half it has been in operation is in excess of 500,000 tons. Mr. McAllister has been in charge since the early part of last year, after having been for some time assistant superintendent at the Tennessee Copper Company's smelter at Copperhill, Tennessee, U. S. A., and his modern and economical metallurgical practice has been the chief factor in making the smelting works a commercial success.

The British Columbia Copper Company, Ltd., is a New York organisation. It was incorporated in 1898 to acquire the *Mother Lode* mine, situated in Deadwood camp, which property the organisers of the company purchased in 1896 and developed from a mere prospect. Mr. Frederic Keffer, of Greenwood, the company's general manager, has been in charge of the company's interests ever since its inception.

The following is a statement of the ore smelted during 1904:—

	Tons.		Tons.
January	18,159	July	16,303
February	17,263	August	17,901
March	19,412	September	18,254
April	14,475	October	19,851
May	18,480	November	16,624
June	17,107	December	16,655
		Total	210,484

From which was produced:—

Total pounds matte	4,978,750
〃 blister copper	2,934,115

The matte and blister contained:—

Fine copper	5,081,743	pounds,	@ 12.823c.,	$651,631 90
〃 gold	36,403.84	ounces,	@ $20	728,076 80
〃 silver	118,418.93	〃	@ 57.221c.,	67,760 50
Total value				$1,447,469 20

Source of ore smelted:—

	Tons.		Tons.
Mother Lode	172,753	Hunter V	144
Primrose	....	Le Roi No. 2	22,262
E. P. U.	....	Lead King	336
Providence	240	Mountain Rose	1,562
Elkhorn	100	Mountain Lion	578
Emma	9,869	Roderick Dhu	47
Oro Denoro	....	Rathmullen	36
Athelstan	1,538	Senator	59
Jackpot	....	Winnipeg	69
Barbara	....	Bay, Ben Hur, Butcher Boy, Carmi, Eureka, Evening Star, Gem, Gold Finch, Gold Bug, Nonsuch, etc., in small lots	371
Helen	....		
Copper King, etc	246		
Cliff	82		
Columbia-Kootenay	135		
First Thought	57		
		Total	210,484

There has been installed at *Mother Lode* a new crushing plant and hoisting arrangement. When completed the plant will consist of two (2) 24 by 36-in opening Jenckes-Farrell crushers, driven by a pair of 100 horse-power engines. Ore will be taken to bins by 36-inch Robins conveying belt. The shaft is being equipped with a pair of skips, of 5-ton capacity each. No other equipment of importance was added during the year.

MONTREAL & BOSTON COPPER COMPANY'S SMELTER AT BOUNDARY FALLS.

At the present time the smelting plant of the Montreal & Boston Copper Co., Ltd, is capable of treating about 650 tons of ore per day, but has sufficient equipment on hand, which could be installed within 30 days, to take care of 1,000 tons a day.

It is the intention of the new company to add a converting plant and increase the smelting capacity to from 1,250 to 1,500 tons per day. At the commencement of the year only one furnace was in blast at these works. In the spring a second was blown in, and later a third was obtained, but this last was not then erected. The furnaces here are 40 by 176 inches, inside tuyere line, and each has a nominal capacity of 300 tons every 24 hours, being somewhat larger than those in use at the other two district smelters.

Three Connersville blowers have been installed at this smelter, two of them in 1903. One No. 7 and one No. 7½ have their own direct-connected 75 horse-power Erie steam engines, while the third, a No. 8, is direct-connected to a 125 horse-power Erie engine, this last mentioned being large enough to provide blast for two furnaces. A Canadian Rand Drill Company's 7 by 12 locomotive, and seven 5-ton Union Iron Works slag-cars were also purchased, and rails were laid to provide for dumping the slag hot instead of granulating, this change having been found necessary here as well as at other district smelters. Additions to plant and machinery, and to buildings, etc., involved a total outlay of about $70,000.

The tonnage of ore treated at this smelter during 1903, was 132,570 tons, of which only 317 tons were dry ores. The 132,253 tons of wet ores produced 3,041,104 lbs. of copper, 52,278.74 oz. silver, and 7,850.005 oz. gold. The dry ores yielded 20,474.57 oz. silver and 150.906 oz. gold. There were 1,061 tons of United States (Republic camp) ores treated, these producing 4,592.69 oz. silver and 615.122 oz. gold.

OFFICE STATISTICS—GREENWOOD MINING DIVISION.

Free miners' certificates issued	633
Locations recorded	267
" " (placer)	9
Certificates of work issued	553
Conveyances recorded	149
Certificates of improvement recorded	57

GRAND FORKS MINING DIVISION.

Report of S. R. Almond, Gold Commissioner.

I have the honour to submit my report of the mining industry in the Grand Forks Mining Division for the year 1904 :—

I am sorry to record that some of the superintendents and managers of mines seem very loth to furnish suitable information on which to base a fair report.

The Granby Smelter.

The directorate of this company appears to have undergone a complete change, and it is reported that the company intends, in the near future, to extend the plant to twelve furnaces, with a capacity of about 5,000 tons of ore daily. During the year 1904 the smelter treated over 597,000 tons of Boundary ore, resulting in 50,694 oz. of gold, 217,472 oz. silver, and 17,843,399 pounds of copper, valued at about $3,000,000; showing an average value of over $5 per ton.

Brown's Camp.

None of the mines in this camp have been worked during the past year. The *Golden Eagle* is under consideration of purchase by a Spokane company, and, if the deal goes through, will possibly, before long, be shipping ore. This mine was worked some years ago and shipped steadily for some time. The ore is said to carry high values.

July Creek.

On the *Hesperus* and *Betts* 200 feet of surface prospecting has been done, consisting of open cuts and shafts, and 1¼ miles of waggon road have also been constructed. This property is, at the present time, being equipped with a five-drill air compressor, and one 60 horse-power boiler; and the necessary buildings, such as compressor building, blacksmith's shop, bunk and boarding-houses, are under construction.

Summit Camp.

In this camp several of the mines are being worked. On the *Oro Denoro* development work has been carried on very actively during the past twelve months, and large bodies of ore have been uncovered, at the same time over 15,000 tons have been shipped to the local smelter. The mine is the property of the Denoro Mines, Limited, with head office at Rossland.

The *Emma*, in the hands of the Hall Mines Co., has shipped over 37,000 tons of ore during the past year.

The *B. C.* was not working during 1904, but it is rumoured that work may be resumed ere long.

The *Brey Fogle* shipped between 200 and 300 tons of ore.

The *Mountain Rose* shipped close on 2,000 tons of ore during the past season.

Considerable development work has been done on the *Lancashire Lass* by the Montreal & Boston Consolidated M. & S. Co. and several buildings put up, but so far the company has not shipped any ore.

Senator.

The *Senator*, owned by C. M. Tobiassen and Henry Hoffman, and at present under bond to the Granby Consolidated Mining & Smelting Co., has been working about seven months, and during that time there have been shipped over 3,000 tons of iron ore for fluxing. The property is worked on the "glory hole" system. The equipment of the mine consists of a 30 horse-power boiler, a 15 horse-power hoist, with derrick of 57-foot mast and 50-foot boom. The buildings put up during the year consist of one box-frame cook-house, 16 by 28 feet, 1½ stories high; one box-frame bunk-house and two log bunk-houses; a barn, 18 by 30 feet; an engine-house, 18 by 28 feet, and a root-house. The company has also built three-quarters of a mile of waggon road from the mine to the Canadian Pacific Railway. The average number of men worked on the mine was 10, with an output of about 450 tons per month.

No. 37.

The *No. 37*, lying west of and adjoining the *Senator*, and owned by J. B. Henderson, was worked by the Granby Co. during the months of May and June, and is at present under bond to that company. This mine was worked in the same manner as the *Senator*, about 360 tons of ore being taken out and shipped to the smelter. Most of the work done consisted in removing about 1,000 yards of wash before the ore-body was reached. The ore is of the same character as on the *Senator*. During the two months the mine was worked the average number of men employed was 12.

WELLINGTON AND GREENWOOD CAMPS.

On the *Rawhide* the Montreal & Boston Consolidated Mining & Smelting Company has installed a gravity tram, capable of handling 600 tons of ore a day, and has built ore-bunkers, blacksmith's shop, bunk-house and dining-room. The management started to ship ore in the latter part of December, at the rate of about 300 tons a day, and expects shortly to increase that amount to 500 tons a day.

The Snowshoe.

This mine has not been operated to any extent during the year just closed, possibly on account of the policy adopted by the company, which is reported to be anxious to amalgamate its property with others, with a view to having its own smelting works. I understand that the mine was unwatered and fully inspected by competent engineers, and that when the inspection was over, everything was put in order for any immediate action. About 100,000 tons of ore have already been shipped from this mine, and I am given to understand that the condition and equipment of the mine are such that it could at any time, if necessary, turn out 500 or 600 tons of ore a day.

The Athelstan.

This property has, generally speaking, carried its values in gold, but report has it that a new discovery, in the shape of native copper, has been made, and, in fact, I was shown a small piece of ore rich in that metal. Between 4,000 and 5,000 tons of ore were shipped during the year.

CHRISTINA LAKE AND BURNT BASIN CAMPS.

During the last year work, except assessment and prospecting work on the various properties held by companies, has been very limited. The reason for the apathy of the claim-owners in these camps is rather an enigma.

CENTRAL OR WHITE'S CAMP.

This camp, although including some very good properties, from which ore was shipped by waggon three years ago, is still at a standstill for want of railway transportation. Possibly, in the near future, this camp may be enabled to demonstrate its capabilities.

FRANKLIN CAMP.

For the following account of this camp I am indebted to Mr. George McLeod, one of the most energetic workers in it:—

The *Monterey* and *Manhattan* are situated on the western extension of the McKinley ledge. There are numerous cuts and trenches exposing copper-gold ore, the average of an 11-foot cut being $17.50, consisting of 7½ % copper, balance gold and silver.

On the *Gloster* a tunnel 200 feet long is being run this fall and winter. The object is to tap the ledge underneath the present shaft, at an estimated depth of 150 feet. The shaft is down 55 feet, in ore all the way, and the bottom is in ore of an average assay value of 13 % copper, and $3.50 in gold and silver.

McKINLEY MOUNTAIN.

On the *Jumbo* an immense iron cap was prospected by open cuts, and large, loose blocks of copper sulphide ore were encountered. The work accomplished was not sufficient to locate the solid formation.

On the *McKinley*, at an elevation of 3,758 feet, an ore-body, estimated at 400 feet wide, occurs at a contact of lime and birds-eye porphyry. The property was heavily covered by fallen timber, but the forest fires this summer got rid of this completely. In the spring a space 40 feet long by 20 feet wide was sluiced off by utilising McKinley creek, and considerable iron and copper sulphide ore exposed. On this exposure an open cut was run across the ore-body, the size of the cut now being 80 feet in length, 40 feet wide, and 30 feet deep; all in ore of an average assay value of 3½ % copper and $2.50 in gold and silver.

About 200 feet easterly along the ledge and about 150 feet higher another large cut 30 feet long, 20 feet wide, and with a breast of 25 feet was made, the ore averaging 4½ % copper and $2 gold and silver. A shaft was sunk 10 feet from the bottom of this cut to determine the dip of the ore-body, and afterwards a tunnel, which is now in 55 feet, was started to cross-cut the ledge at a depth of 125 feet.

Numerous bodies of chalcopyrite, from 4 to 6 feet wide, traverse the main ore-body.

In addition, about 50 trenches were made over the hillside, and almost invariably the characteristic iron capping was encountered. Another 8-foot ledge, parallel, and lower down the hill, was exposed for 600 feet, but no attempt was made to open it up. It contains copper sulphides and lead carbonates in a lime gangue.

A number of substantial buildings have been erected, good trails constructed, and preparations made to ground-sluice a large part of the ore-body this coming spring by damming and fluming the water of McKinley creek.

Eight men are at work under the direction of A. D. McPhee. Machinery will be installed in the spring, should the Government assist in completing the waggon road the remaining 7 miles to the camp.

Assessment work was done on a number of very promising outcrops, and this coming summer considerable development is looked for.

OFFICE STATISTICS—GRAND FORKS MINING DIVISION.

Certificates of work issued	366
Locations	190
Conveyances, etc	105
Certificates of improvement	26
Permission to re-locate	2
Filings	38
Water rights	2
Free miners' certificates	315
Companies' "	2
Special "	1

NOTE BY PROVINCIAL MINERALOGIST.—The Lightning Peak camp is distant about 70 miles from the recording office at Grand Forks, being situated at the extreme head of the west branch of the north fork of Kettle river. Owing to its inaccessibility, the camp has not been otherwise reported on, and the Provincial Mineralogist is indebted to Mr. Wm. Thomlinson, of New Denver, manager of the *Lightning Peak Group*, for the following particulars of claims in this section.

LIGHTNING PEAK CAMP.

In the Grand Forks Mining Division, but over 70 miles from the recording office at Grand Forks, there is a section of country containing some promising mineral properties, which has apparently as yet received but little attention from mining men, or from the general public. The mineral section referred to is at and around the extreme head of the west branch of the north fork of Kettle river, and at present is reached by road and trail from Fire Valley landing, on the west side of the Lower Arrow lake. The principal properties at present are the *Lightning Peak*, *Rampolla* and *Waterloo Groups*, but there are also a number of likely undeveloped properties in the district.

The *Lightning Peak Group*, consisting of seven claims, four of which are being Crown-granted, is owned by capitalists of St. Paul, Minn., U. S. A., represented by their agent and manager, W. Thomlinson, of New Denver, B. C. During the past season the following preliminary work was done to open up the property. About 16 miles of pack-trail was built from Fire Valley to the property, and camp equipment, provisions, mining tools and supplies were packed in, sufficient to carry on development work, with a small force of men, till the end of the year.

Four of the claims were surveyed for Crown grants, and considerable surface work and about 80 feet lineal of underground development was done on the group. A five-ton general sample of ore was sacked and brought out to the smelter at Nelson, B. C., as a test of values, and gave satisfactory results, the smelter returns showing 164 ozs. silver to the ton, and 26 per cent. lead.

The present route from Fire Valley landing to the property is about 26 miles in length, of which about four miles is waggon road and the remainder fairly good pack trail. Transportation charges are at present very heavy, but as the several properties get opened up, and ore tonnage increases, these may be gradually reduced.

The *Rampolla Group*, owned by Scaia Brothers, of Fire Valley, is Crown-granted and has considerable development work done on it. Good values in gold and silver are shown by assays, but no ore has yet been shipped from this property.

The *Waterloo Group*, owned mainly by parties residing in Grand Forks, has been developed to some extent. Two small shipments of ore have been made, one of which gave the high returns of 669 ozs. silver, $10.30 gold to the ton, and 45 per cent. lead.

The Scaia Brothers have done considerable development work on an extension of the *Waterloo Group*, and have several promising showings of ore.

To the west of the *Waterloo*, Messrs. Glover *et al.*, of Fire Valley, have located a number of claims, on which high-grade silver minerals are said to occur, but these claims and a number of others at different points in the district, have not yet had enough work done on them to allow of their value being even approximately estimated.

In a different section of country, situate north of Wauchope, near the head of Fire Valley river and tributary to Fire Valley landing, there are also a number of likely mineral properties, notably the *Paladora* or *Olds Group*, on Eureka mountain. This property has been favourably known for some years, but its sale and development have been retarded mainly by lack of transportation facilities. The ore is of a kind likely to require local treatment and mills or other plants are not easily or cheaply conveyed over a pack trail. At present a movement is being made to secure from the Provincial Government a grant sufficient to construct a sleigh road northward up Fire Valley for a distance of about 16 miles. This road, if built, will serve all the properties tributary to Fire Valley landing or Edgewood, as well as the properties included in the *Lightning Peak*, *Rampolla* and *Waterloo Groups* on the north branch of Kettle river.

OSOYOOS MINING DIVISION.

Report of C. A. R. Lambly, Gold Commissioner, Fairview, B. C.

I have the honour to submit my report of the mining operations in this division for 1904.

Camp Fairview.

In this camp but little work has been done during this year. On the *Morning Star* a drift was run at the 100-foot level for 50 feet on the vein, and cross-cut 35 feet, showing the vein that width in good ore.

On the *Stemwinder*, owned by the New Fairview Corporation, the following is a short summary of work done. During the early part of the year a fault was encountered, which rendered further extraction of ore for milling purposes inadvisable until the main vein was re-located under the break, which cut off the ore-body previously worked, from the east second level to the west fourth level of the mine. This, after much trouble and expense, was accomplished. The new ore-body was discovered below the fault and opened up north of the previously worked ledge. A mill test of 60 tons, taken out during a cross-cut at the point of contact with the new ore, gave satisfactory results. The whole work during the year consisted of development and exploration.

Lower Similkameen.

On the *Manery Group* of claims, owned by the Eclipse Mining and Milling Company, of Oskaloosa, Ohio, U. S. A., the following work was done:—A winze was sunk on the *Buller* claim about 80 feet, showing a good grade of ore almost the entire length. A tunnel was run on the *I. X. L.* claim about 90 feet, about 25 feet of which was in ore, but then encountered a fault. This tunnel will be extended next year to strike the ore-body at greater depth. Good gold values were found on this claim. A tunnel about 25 feet was run in on the *Apex* claim, which shows a solid body of mineralised quartz, from 4 to 6 feet wide, with good gold values.

Olalla and Keremeos Valley.

In this part of the district very little development has been done this year. On the principal claims the work has reached the state when further work would be useless, without having milling or smelting conveniences, and in most cases the owners are waiting for railway transportation before installing machinery for working the mines.

The following information regarding the principal properties in the Olalla and Keremeos Valley districts, is supplied by Mr. C. W. McDougall, who is interested in these sections:—

Olalla Camp.

Bullion Group.

During the past season the work accomplished on this group consisted of extended open cross-cutting and tunnelling. The strike of the ore-bodies occurring within the extended ore zone on this property was defined as north-easterly and south-westerly. The full extent of the available surface ore supply has not yet been fully determined, and more work will be undertaken shortly for this purpose. The underground work consists of about 75 feet of tunnelling, much high-grade ore being exposed as a result. The values obtained from this property run from $1 to $40 in gold; silver, a few ounces; copper, 1 to 20 %. The gangue consists of lime, garnetite, and from 12 to 40 % silica. The position of the property is excellent, the ore-showing extensive, and only railway facilities are lacking to enable it to be operated on a profitable basis. This property was surveyed during 1904, and is now being Crown-granted.

Flagstaff Group. The tunnel on the *Searchlight* claim of this group was extended about 100 feet during the past year. Other work consisted of open cuts, for the purpose of defining, as nearly as possible, the boundaries of the large deposits of magnetite, carrying small gold and copper values, which occur on this group. Ore values run from $2 to $25. The gangue consists of lime, garnetite, and a small per centage of silica. This group is capable of supplying large quantities of self-fluxing ore, that will render it a source of profit to its owners as soon as the needed railway facilities are available. The *Flagstaff Group* was surveyed last fall, and Crown grants are now being acquired by its owners.

Opulence. This is a high-grade copper property. No gold or silver values are obtained. The copper occurs as native in an altered rock, which in appearance is not unlike a hard black coal. Copper values run from 2 to 30 %. A shaft 50 feet deep, with a cross-cut of about 35 feet at the bottom, is sunk in the lead, which, however, has not yet been fully cross-cut or its extent determined.

Elkhorn Group. Considerable high-grade ore has been opened on this property. The values are mostly in copper, but from $1 to $5 in gold is often obtained in addition to the copper values. Like other properties in this camp, further development is conditional on railway facilities becoming available. The entire group is Crown-granted.

Copper King. This property possesses a very fine showing of copper ore in a lime and garnetite gangue. A large amount of surface work has been done, as well as shaft sinking and tunnelling, much of which was carried out during the past season. This property, like all others here, is idle, awaiting better methods of transportation.

Dolphin Group. Development work during the past year, on this property, consisted of open cut and tunnel work, immense quantities of heavy iron capping being cut through. The ore opened is principally copper, with small gold and silver values. This group should be amongst the first heavy producers in this camp.

Mount Zion. This property has been idle during the latter part of last season. The development consists of a long cross-cut tunnel, open cuts and sinking, much of which was carried out during 1904. The values are in copper, gold and silver, the latter running up to 20 oz. occasionally. This property is admirably situated for economical operation, and will doubtless become an important producer.

Golconda Group. This property has been idle during the past season. It is opened by some 250 feet of tunnel. It is expected that this, like all other important properties here, will remain idle until adequate transportation facilities are accorded the camp.

The *Homestead-Silent Friend Group* has lately been surveyed, preparatory to Crown-granting. The copper and gold-bearing strata require more extended development.

The *Star of Hope Group* is situated between the head of Cedar and Sixteen-mile creeks. The work last year consisted of shafts, tunnelling and open-cut, exposing three different ledges. The ore is lead, galena and arsenical iron, carrying gold values. The values run from $15 to $95 per ton. This property has every chance of making a profitable mine when developed.

Upper Keremeos Creek Camp.

Le Roi and Scotia Group. During last season a tunnel and cross-cut therefrom were run on this property. This work disclosed an extensive body of high-grade copper-gold ore, running about 5 % copper and several dollars in gold. The property is well situated for operation through tunnels.

Apex Group.

This property was extensively opened up last season by the owners, and large bodies of copper-gold ore exposed. The values from the *Apex Group* are above the average, and there is little doubt but what it will become a valuable property.

Green Mountain Group.

This group was Crown-granted some time ago, and has since been allowed to remain idle by its owners. It possesses an immense pyrrhotite capping, throughout which extensive open-cuts and short tunnels have been run. Values up to $8 have been obtained.

Keremeos-Pontiac Co. Properties.

This group has been extensively developed by tunnels, shafts and cross-cuts, high-grade copper-gold ore being met with. During 1904 a large amount of work was done and results of a gratifying character met with. This property is situated in the copper-gold belt of the Upper Keremeos Creek Valley.

Riordan Mountain Group.

This property is remarkable for the immense surface showing of ore which occurs within its boundaries, and which caps the entire summit of Riordan mountain. During last season considerable open-cut work was done, and a tunnel extended into the ore for the purpose of rendering it available for stoping. The values are in gold and copper, the gangue being principally lime and garnetite, with a proportion of silica. This property was surveyed last year and Crown grants are now being acquired.

Penticton Group.

This group, situated on Stevenson mountain, about 1½ miles north of Riordan mountain, at the headwaters of Keremeos creek, possesses an immense pyrrhotite capping. Work last season consisted of open-cuts throughout the capping.

CAMP HEDLEY.

In this camp the chief work has been done by Mr. M. K. Rodgers, on the properties managed by him and owned by the Yale Mining Company and the Daly Reduction Company. Work by the Yale Mining Company was confined principally to the *Nickel Plate*, *Sunnyside* and *Bulldog* mineral claims. On the *Nickel Plate*, about 500 feet of drifts, tunnels and raises were made during the year. Stoping of ore began about the middle of the year, and about 10,000 tons were shipped from the mine during the year. On the *Sunnyside*, about 200 feet of tunnel was run and about 200 tons of ore were shipped. About 30 to 50 men were employed by the Yale Mining Company during the year.

The Daly Reduction Company has a 40 stamp-mill completed, and about 9,000 tons of ore were treated. The 20-Mile creek flume, 4 feet by 4 feet, was finished. The electric tramway and gravity incline have been in operation since the month of June of this year. About 50 to 60 men have been employed during the year.

OFFICE STATISTICS—OSOYOOS MINING DIVISION.

Free miners' certificates issued	248
Records of location issued	195
Certificates of work issued	439
Records of conveyances	69
Certificates of improvements issued	13

VERNON DISTRICT.

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VERNON MINING DIVISION.

REPORT OF L. NORRIS, GOLD COMMISSIONER.

I beg to say that during the past year but little development work has been done on the mines in this division, other than the necessary annual assessment work, except on Monashee mountain, where the Cherry Creek Mining Co. drove a tunnel for 35 feet on the *Morgan* claim, and a tunnel of 100 feet with upraises, aggregating 175 feet, on the *McPhail Group*.

There has been considerable work done on the *Gale Group* of claims, on the west side of Okanagan lake. This group lies between Siwash creek and Six-Mile creek, and consists of the *Rossland*, *Violet*, *Gale* and *Garnvillo* claims, located some three years ago and now owned by Jas. Hamilton and A. W. Birnie, of Vernon. The work on the group consists of, on the *Violet*, a cross-cut of 35 feet and an inclined shaft of 19 feet, all in ore, and one shaft of 20 feet; on the *Rossland*, one shaft of 20 feet and one of 9 feet; on the *Gale*, one shaft of 35 feet and one of 12 feet, the latter entirely in ore; and on the *Garnvillo*, one shaft of 25 feet and one of 15 feet and a crosscut of 20 feet. The chief values are in gold and copper. The three claims, the *Violet*, *Rossland* and *Garnvillo*, are all located in line along the one contact lead, lying between limestone and porphyry. The ledge in places is not very clearly defined, and is rather of the nature of a "blow-out." The assay values run from $5 to $55 per ton. On the *Gale* claim, which lies off and alongside the main lead, the pay chute is 16 inches wide and dips towards the main ledge on the other claims. At least $4,000 has been expended on this most promising property, which has a good waggon road running up to it from the lake shore.

Last year, S. Hill and A. McKay, of Revelstoke, located the *Stult*, *Joe Chamberlin* and *Silver Bell* claims, on the north fork of Cherry creek, nearly north of and distant about 6 miles from the old *Monashee* mine. They stripped the ledge for about 400 feet, exposing ore carrying good values in free gold and native silver, and drifted for 150 feet, tapping the ledge at about 80 feet from the surface. The ledge at this depth is well mineralised and is similar to the ore on the surface. This strike is the most important one made last year, and I regret that I was unable to visit the locality and report more fully on it.

Last year I reported that the mill test of the ore from the *Morgan* mine, on Cherry creek (running from the 15th to the 30th December last), was satisfactory. It has since transpired that the test gave $25 per ton of free gold on the plates and concentrates worth $200 per ton. There were no mills running this past year.

Below is appended the office mining statistics furnished by Mr. F. H. Wilmot, Mining Recorder:—

OFFICE STATISTICS—VERNON MINING DIVISION.

Individual miners' certificates issued	99
Companies "	1
Certificates of work recorded	42
Conveyances	7
Mineral claims recorded	31
Placer claims "	1
Certificates of improvements	2
Crown grants of Mineral claims issued	2

YALE DISTRICT.

Report of G. C. Tunstall, Gold Commissioner.

I have the honour to enclose the annual mining reports for the Kamloops, Ashcroft, Yale and Similkameen Mining Divisions for the year 1904. The lack of capital in this district still acts as a formidable obstacle to the opening up of the mineral locations, which, in many instances, exhibit large bodies of ore. In the Jacko lake section, about six miles south of Kamloops, there are deposits of chalcopyrite on the *Kimberly*, *Monte Carlo*, *Wheal Tamar* and other claims, exposed by shafts and open cuts. On other portions of Coal hill similar results are visible, and claim-owners have firm confidence in their holdings.

The Glen Iron Mining Co.'s property has lain idle for some time. Its output was formerly used for fluxing purposes by the Nelson Smelter until a new and more convenient source of supply was discovered. The Cinnabar mines, north of Kamloops lake, have not been worked recently.

The operations of the Kamloops Coal Development Company are looked upon with deep interest, as the discovery of a suitable seam would have an important bearing on the mining interests of the district, and would enable the working of low-grade ores which cannot bear the expense of transportation to distant points for treatment. The same remarks apply to the discovery of coal at Enderby, where a large seam of coal is believed to exist, about five miles north of that town, at an elevation of about 1,100 feet above the railway track. This may lead to the resumption of navigation between Enderby and Kamloops. The distance from Enderby to Kamloops is 110 miles, and transportation can be effected by water at a comparatively small cost, but has been discontinued since railway construction.

KAMLOOPS MINING DIVISION.

COAL HILL.

Iron Mask Group.

The *Iron Mask Group* consists of seven claims, of which the *Iron Mask* is the principal location. Development on this property has been systematically prosecuted by Capt. Argall, and the shipping stage was reached last autumn, after the completion of the 100-ton concentrator. Several experiments were made before the results were considered satisfactory, and the changes effected have rendered it thoroughly efficient. Preparations are now being made to enlarge its capacity to 200 tons a day, to accommodate a larger output next season as the different levels show up large bodies of shipping ore. The average gross value of the shipping ore is from $30 to $35 per ton, which includes from $2.40 to $4 in gold. Transportation to the railway track is effected by a 100 horse-power traction engine, capable of drawing 30 tons. An excellent waggon road, four miles long, with comparatively easy grades, was completed last summer and macadamised to meet the requirements of heavy traffic. Very favourable arrangements have been made with the Trail smelter in regard to freight and treatment, in consequence of the ore, in common with the mineral deposits of Coal hill, being of a fluxing character, and, therefore, in demand for smelting purposes. The average number of men employed last summer was 65, although a much larger number was occasionally engaged. Every facility is supplied for their comfort in a large boarding-house, capable of accommodating 100 persons. The ore shipments amounted to 975 tons.

Dewey Group.

The *Dewey Group*, consisting of the *Dewey*, *Black Beauty* and *Cyclone*, is situated on Jones mountain, about six miles south of Kamloops. The ore is chalcopyrite, running from 7 to 22 per cent. in copper and from $1 to $3 in gold to the ton. The work accomplished on the *Cyclone* consists of a tunnel 85 feet long, cross-cuts 150 feet long, and one deep cut running on the vein, with an 18-ft. face at its extremity, exposing a vein of ore from 3 to 4 feet wide. Work will be prosecuted under the superintendence of C. W. Nesbitt during the winter. This property belongs to a Seattle company.

Monte Carlo and Ajax Groups.

These properties embrace some of the most promising locations on Coal Hill. The *Monte Carlo Group* consists of the following claims:—*Monte Carlo*, *Sultan*, *Anaconda*, *Vulcan* and *Whitecap Fraction*, situated six miles south of Kamloops. The principal showing is found on the *Monte Carlo*, where by means of extensive cross-cutting, a vein fully 20 feet wide has been exposed. The ore is chalcopyrite, which is found four feet below the surface. On the footwall of the lead is a band of high-grade copper, 16 inches in width, said to carry 17 per cent. copper, and $4.40 in gold per ton. There is a similar band six inches wide on the hanging-wall, of equal value, and several stringers three inches wide between the two bands mentioned. The rest of the vein rock is also impregnated with copper. The strike of the vein is nearly due north and south, with a slight dip to the west. Running parallel to this, and just within the side-line of the *Sultan* claim, which lies to the east of the *Monte Carlo*, is another vein, on which a shaft has been sunk some 18 feet, and ore of a similar character to that on the *Monte Carlo* been found. There are also many surface cuts exposing the lode in various places. The *Anaconda* lies to the south of the *Monte Carlo*, and is supposed to be intersected by the vein of the latter. There are also copper showings of lesser importance exposed on this claim, on which no prospecting has been done. The *Whitecap Fraction* and *Vulcan* lie to the east of the *Monte Carlo*, and each of them has fair showings. The *Vulcan* has an excellent site for a concentrator and necessary buildings. A creek runs through the group, from which a plentiful supply of water can always be obtained.

Adjoining the *Monte Carlo Group* is the *Ajax Group* of claims, respectively named the *Ajax*, *Hercules*, *Jupiter*, *Neptune* and *Mars*. The principal vein is on the *Ajax*, where, by extensive cross-cutting and a shaft, a large lead has been found. At the point where the most work has been done the rock is greatly decomposed, showing a quantity of copper carbonates. In another locality, where no oxidation has taken place, solid copper pyrites is found. The strike of this vein is nearly east and west, with a moderate dip to the north. East of the *Ajax* is the *Mars*, where a deposit of a similar character is found, the ore being identical with that of the *Ajax*. On this claim a shaft has been sunk 25 feet and cross-cuts run, showing good results. The *Jupiter* possesses a wide vein, on the hanging-wall of which is a band of copper ore eight to ten inches wide, carrying copper and gold values. The *Hercules* has a vein 8 feet wide, which has been cross-cut in several places on the surface. A shaft has also been sunk, in which is found a paystreak of about 18 inches, assaying 9 per cent. in copper and $3 in gold. The *Neptune* has three shallow shafts, and surface work.

Hecla Group.

The *Hecla Group* is situated about one mile north of the *Monte Carlo*, and consists of three claims. On the principal location a shaft has been sunk on the lode to a depth of 60 feet. Several cross-cuts intersect the vein, which is of considerable width, and has been traced for a distance of 1,000 feet on the surface. The assays average 5 per cent. copper and $4.50 in gold to the ton. This property adjoins the *Kimberly* and *Python Group*.

The *Number Seven* lies a short distance from the *Hecla*. It has an enormous body of low-grade copper-gold ore over 40 feet wide, exposed by cross-cuts for a distance of 500 feet.

Wheal Tamar Group.

The *Wheal Tamar Group* lies about half a mile south of the *Monte Carlo*, near Jacko lake, and is owned by Mr. Boillot, of Oakland, Cal.; G. D. Hamson, of Vancouver; and O. S. Batchelor, of Kamloops. It embraces the *Wheal Tamar*, *Tamar Fraction* and *Blizzard Fraction*. A new shaft is at present being sunk on the ledge in an oxidized zone, which shows rich oxides and carbonates. The vein has a width of about 150 feet of low-grade gold-copper ore. A shaft has been sunk 40 feet, from the bottom of which returns have been obtained amounting to seven per cent. of copper. Some of the smaller bands of ore have assayed 28 per cent. copper. The deposit has been traced the full length of the claim. The property has been opened up by three shafts to a depth respectively of 50, 40 and 15 feet, and by open cuts. The ore carries gold and silver values as well as copper. This and the foregoing claims can be worked on a large scale.

Evening Star.

The *Evening Star* is situated about six miles south-west of Kamloops, and adjoins the *Iron Mask*. It is owned by John Morrison, of Kamloops. The vein is 42 feet wide, composed of chalcopyrite lying in a diorite formation. The work on the property consists of a timbered shaft 30 feet deep, and an open cut at the eastern extremity 100 feet long, averaging 5 feet deep, at the termination of which is a shaft 17 feet deep.

Orphan Boy Group.

The *Orphan Boy Group* consists of three full-sized claims, viz.: the *Orphan Boy*, *Last Chance* and *Manitou*. Most of the development work has been done on the *Orphan Boy*, and consists of a shaft 35 feet deep, besides cross-cuts showing the trend and breadth of the vein, which is about 40 feet wide. At the foot of the shaft a drift has been run to the hanging-wall, exposing a body of pyritic ore 8 feet wide. The ledge has been traced 1,500 feet across the adjoining claim, the *Last Chance*.

Delaney Group.

The *Delaney Group* adjoins the *Orphan Boy*. It consists of two fractional claims, the *Delaney* and *Queen of May*. All work of any importance has been done on the *Delaney Fraction*, which has a shaft 64 feet deep. At the 60-foot level cross-drifts, 22 and 23 feet long, respectively, north and south of the shaft, intersect a body of low-grade copper ore.

Grass Roots.

This claim is situated south of Kamloops, near Jacko lake, and is easily reached by a good waggon road. A good deal of development work has been done during the past eight years, nearly all, however, in the form of open cuts and shafts on the surface. These have exposed five separate and distinct veins of ore, varying in thickness from 3 to 16 inches. The ore is a mixture of magnetite, copper pyrites, calcspar and silica. One vein of decomposed pyrites contains free gold, which may be separated by panning. The several veins vary in the proportions of iron and copper, one sample showing little copper and assaying $7.80 in gold to the ton. A second sample gave 11.36 per cent. copper. The claim is traversed by a dyke of porphyry impregnated with finely disseminated iron pyrites, carrying from a trace to $1 in gold. Fifteen hundred dollars has been spent in development work on this property. In a report on the *Grass Roots*, W. T. Newman, M. E., of Vancouver, says as follows:—"The conditions so far merit and warrant the expenditure of a reasonable amount of capital in further development work, etc., etc."

Truth Group.

The *Truth Group* lies 5½ miles in a south-westerly direction from Kamloops. It includes the *Truth*, *Hope*, *Pearl*, *Jeannie* and *Dakota*, covering a total area of 247.63 acres, owned by Messrs. A. G. McDonald and Joseph McGee. The country rock is diorite, which is identical with that which exists in the Rossland, Phœnix and other mining camps in the Boundary district. The vein is a felsite matrix of great width, bounded on two sides by trap and iron dykes. A shaft, 80 feet deep, has been sunk on the *Truth*, from which a drift has been run 100 feet on the ore-body, which was ascertained to carry values ranging from $1.28 to $66.64 to the ton. Cross-cuts on the *Pearl* and *Dakota* have proved the existence of the same character of ore a length of 1,800 feet. A tunnel has also been run on a lode 12 feet wide, first encountered in the shaft. This body has been traced on the surface a distance of 1,500 feet by open cuts, whilst working on this chute a large cross-vein 42 feet wide was exposed, running east and west over the entire length of the property on the north side of the main body. This ledge is strong and well defined by foot and hanging-walls. A shaft 30 feet deep was sunk on this vein, which shows some clean copper pyrites. Numerous cuts on the surface expose the various veins and ore-zones to advantage.

Dakota.

The *Dakota* has a strong vein of magnetite about 40 feet wide. The ore carries small veins, containing gold, silver and copper, and about 75 per cent. in iron. There are also two other leads of the same kind of ore, on one of which a shaft 20 feet deep has been sunk, showing good ore.

O. K. Group.

On the *O. K. Group*, which is situated midway between the *Iron Mask* and *Python*, and at the centre of Coal Hill, the development work done during the year consists of a tunnel run to cross-cut the upper lead. The ore-body was encountered at some 35 feet down, and was intersected 15 feet. The face of the drift is still in ore, so that the extent of the body is undetermined. The ore is a chalcopyrite, containing gold values. High grade chutes and lenses of varying size scattered through the vein give assay values of 22 per cent. copper, and as high as $42 in gold. Although the work done on this group is not extensive, it is sufficient to indicate the existence of two distinct veins of large size, carrying good values. The lower lead, which is believed to be an extension of that being worked at the *Iron Mask*, is opened up by a shaft 85 feet deep, with cross-drifts at the 50-foot level, aggregating 65 feet, besides a considerable amount of surface work. The other lode is opened up by the tunnel run this year, and by a shaft 20 feet deep, and cross-cuts along the surface.

JAMIESON CREEK.

Homestake.

The *Homestake* claim is situated on Jamieson creek, about 17½ miles north of Kamloops. It was located in 1897. The formation, according to Dr. Dawson, is an intrusive granite and argillite. It occurs in large-sized areas as well as dykes, cutting through the hard slates, and contains more or less quartz-veins along its entire course to the head of the creek. There are several veins on the *Homestake*, varying in width from 2 to over 40 feet, which contain a large amount of mineralised quartz, carrying iron pyrites and galena. Development consists of several shafts from 8 to 20 feet in depth, and numerous open cuts on the different veins, which run north-west by west, and dip slightly to the south-west. The values range from $3.60 to over $20, with probably an average of $12.50 in gold and silver. About 60 per cent. of value is in gold. The ore is capable of being worked by the cyanide process. The location can be developed by tunnel to a depth of 1,000 feet, and it has been bonded by parties who are actively engaged in developing the property.

The *Molly Gibson* lies south of the *Homestake* and shows a vein 5 feet wide, with ore similar to that found in the latter claim.

SALMON ARM.

Mount Ida.

The *Mount Ida* mineral claim is situated four miles south of Salmon arm, on the north-west slope of Mount Ida. The present location was staked by Mr. F. A. McLeod about a year ago. Some rich silver float had been previously found in the vicinity, and was the cause of considerable excitement. Efforts were made by several parties to find the lode, but without success, owing to dense timber and depth of alluvial deposit.

It has apparently been discovered by the present locator in the bed of a small stream which crosses the vein at right angles. Several cross-cuts have uncovered the lode for 38 feet without attaining the opposite wall. The vein-matter consists of a quartz gangue impregnated with mineral. The country rock is porphyry. Work is at present being actively prosecuted.

Coal at Kamloops.

A local company, known as the Kamloops Coal Development Company, started to work late last fall, and sank a shaft through sandstone a depth of 380 feet, at a point several hundred yards east of the old Guerin tunnel on the creek running through what was formerly called the Hudson's Bay Company's farm. Several seams, differing in thickness from a few inches to one of over two feet, separated by layers of sandstone, were encountered. A drift was run from the bottom of the shaft a certain distance, from which some six or seven tons of first-class coal were obtained. A great improvement was noticed in the distribution and increased number of seams exposed, on those found in the Guerin tunnel. These favourable changes have led to the belief that further east a body will be found that will prove sufficiently valuable to work. The drift looks so promising that the property has been bonded by Mr. Morrish, of London, England, one of the directors of the company which owns the *Iron Mask* mine, who intends to sink another shaft over a quarter of a mile east of the present site.

Coal at Enderby.

About two months ago a great deal of excitement was caused by the discovery of a seam of coal near the summit of a mountain, about five miles north of Enderby. The coal is said to be of excellent quality and is stated to be four feet thick, so far as could be observed, but may prove to be of greater extent, as it is partly covered by slides from the mountain. Parties interested, I am told, have applied for the purchase of 3,000 acres of land in the vicinity. A tunnel will be run to ascertain the extent of the deposit. Should expectations be realised a strong company will be formed to operate the mine on a large scale.

Placer Mining.

The dredge on Tranquille creek started to work last June. Operations ceased during a period of two months, owing to the scarcity of water, caused by an unprecedentedly dry season. The gravel worked measured 150 yards long, 200 feet wide and 15 feet deep. Frequent breakages, and time and expense incurred in making repairs, are great obstacles to this branch of mining. The cost of fuel also is great, and the returns are not deemed satisfactory, a condition for which the auriferous character of the gravel cannot be held responsible.

The yield of gold for the past year is $6,066.

OFFICE STATISTICS—KAMLOOPS MINING DIVISION.

Claims recorded	112
Certificates of work	181
Bills of sale	36
Mining leases issued	19

Revenue.

Free miners' certificates	$2,159 50
Mining receipts general	1,424 15
Tax on Crown-granted mineral claims	393 95
	$3,977 60

The following additional notes as to claims in the Kamloops Division, in the vicinity of Nicola, are supplied by Mr. George Murray, Deputy Mining Recorder at Nicola:—

On Ten-Mile creek, the Broomhead Syndicate, owning a group of eight claims, ran a cross-cut tunnel 75 feet, to cover required assessments. The intention is to prosecute work until the strong copper lead which shows on the surface is reached.

The *Great Western Group*, in the same vicinity, gives good promise and has been carefully prospected. A 60-foot tunnel and considerable surface prospecting have been returned as work done on the claims forming this group.

On the *Interior* mineral claim a double-compartment shaft is being sunk, from which a cross-cut to the vein will be made. If indications already obtained are sustained at the depth reached by the shaft, the owners of the *Interior* will be well repaid for their toil.

The work on the *Saucy Sally* and *Saucy Lass* consists of shaft extension. The lead on those claims is about 50 feet wide, the greater portion of which is well mineralised, and when cut from the bottom of the shaft, it is fully expected that a body of high-grade ore will be encountered.

Recent work on the *Golconda* has exposed a 5-foot vein, which yields fair assays.

An assessment each has been done on the *H. L.*, *Mary Maud*, *Alice* and *Champion*, designated the *Pan American Group*.

Work during the past year on the Ten-Mile creek mineral claims strengthens the conviction that there will be a prosperous camp in that locality when ample capital is enlisted.

ASHCROFT MINING DIVISION.

REPORT OF J. W. BURR, MINING RECORDER.

SIR,—I have the honour to submit herewith my annual report on mining operations in the Ashcroft Mining Division for the year ending 31st December, 1904.

Placer Mining.

Placer mining on the Fraser and Thompson rivers has not been carried on as extensively this year as formerly, and, in consequence, the amount of gold mined in this way is not near the mark of previous years.

Dredging operations on the Fraser river, above Lytton, have not proved as remunerative as was expected. The Fraser River Gold Dredging Co. built a new dredge, which was completed this spring, and from which great results were expected, but, unfortunately, after work was commenced the machinery could not stand the heavy and constant strain and kept breaking. This involved a great loss of time and money and a very short season.

The old dredge worked till the 1st of December and took out a lot of gold. It was moved up the river several miles, with the intention of putting it on another of the company's leases, but the water being so low it could not be got over some of the bad places in the river, and work was abandoned until spring. In the meantime, the intention is to take it down to Kanaka Bar, where the company has a lease which is believed to have a very rich pay streak.

The amount of gold taken out for the year by placer mining is about $24,000 for this District.

Mineral Claims.

In Highland valley, some ledges of copper-gold ore have been discovered this year, and the coming year will see development work carried on there. The mine-owners are very anxious to see the waggon road into the valley completed as early as possible in the spring, so as to enable them to get in machinery and provisions and bring out the ore which is accumulating on the dumps. The ore is distributed all through the mountains on each side of the valley. Assessment work on all the claims has been done for the year.

OFFICE STATISTICS—ASHCROFT MINING DIVISION.

Free miners' certificates issued	78
Mining receipts, general	77
Certificates of work	36
Mineral claims recorded	52
Placer "	4
Certificates of improvement	6
Bills of sale, &c	7

Revenue.

Free miners' certificates	$ 653 75
Mining receipts, general	1,020 30
Tax on placer gold	389 00
Total	$2,063 05

YALE MINING DIVISION.

REPORT OF WILLIAM DODD, MINING RECORDER.

I have the honour to submit herewith my annual mining report and office statistics for the Yale Mining Division for the year ending December 31st, 1904.

Placer Mining.

There is practically nothing of note to report under this heading since my last return. The output of the Chinese miners constitutes the sum total of the recovery, and even that has become unimportant.

Although material was on the bank ready for building the proposed wingdam, the late winter level of the Fraser river, which is the extreme low water period, was rather higher than usual, and did not permit of the resumption of work on the "Saw-mill riffle," above Hill's Bar, owned by the local Castle-Revesbeck syndicate, which promised so well during the very brief working season in the abnormally low water of 1903.

The Yale Hydraulic Mining Co. completed its pipe-line of about a mile, and was enabled to hydraulic for a month.

Mineral Claims.

If it were not for the two new concerns on Siwash creek, there would be little or nothing doing in connection with lode mining. In the absence of recent authoritative information from the management of those companies, as also in view of the fact that they have, since my last report, been inspected by a member of the staff of the Bureau of Mines, I may confine myself to stating that during the past twelve months the Mount Baker and Yale Mining Co. has completed its ten-stamp mill and the International Gold Mining Co. its three-stamp, triple discharge battery. The former company has at present some eight men employed, and the latter about twenty. Both concerns are still engaged in completing their surface plant, equipment and buildings, and in getting out timbers for the saw-mills attached to the respective properties. The stamps have been in operation for the past three months.

Regarding other mineral locations mentioned in former reports, such as the silver-lead camp of Summit City, the *Murphy* mine, *King Group*, etc., there is no news. The auriferous arsenical iron pyrites on the *Wardle-Burton Group* at Hope, which carries small percentages of nickel, has not been developed, and on the *Mountain Spring* claim at Yale, Ed. Stout and partners have sunk prospecting shafts and stripped the ledge in places.

OFFICE STATISTICS—YALE MINING DIVISION.

Free miners' certificates issued	104
Mineral and placer claims recorded	56
Leases recorded	14
Certificates of work	43
Bills of sale and permits	10
Leases in force—dredging and hydraulic	32

Revenue.

Free miners' certificates	$ 521 75
Mining receipts	3,159 30
Miscellaneous	575 50
	$4,256 55

NOTE.—Owing to the abnormally dry season, which prevented the working of the creeks and benches, the yield of gold has been limited to $3,000, the smallest return that has yet been made. Individual placer mining on the bars of the Fraser in this Division is a thing of the past.

NOTES ON SIWASH CREEK CLAIMS.

BY H. CARMICHAEL, PROVINCIAL ASSAYER.

SIWASH CREEK.

Siwash creek flows into the Fraser river from the south, about two miles above the old town of Yale, and is reached by walking up the C. P. Railway track for two miles, and crossing the Fraser in a cage on a cable ferry suspended some 50 feet above the river. At the mouth of Siwash creek several placer leases have been taken up, and pipes are now being laid to work the ground by the hydraulic system. The mineral claims on the creek have all been located at the junction of the north, south and middle forks, about four miles from the Fraser river, and about 1,200 feet above the level of the C. P. R. track, and a waggon road has been built from the river to the claims. Two companies are operating here, and between them own all the claims, the Mount Baker and Yale Mining Co., Ltd., owning the *Old Puss*, *British Queen Captain Jack* and *Louisabelle*, while the *Ward*, *Ruby* and *Independent* are operated by the International Gold Mining Co., Ltd. The first-named company has worked chiefly on the *Old Puss*. On a spur of the mountain, between the middle and south forks, a tunnel has been run in over 20 feet on a porphyry *dyke, slightly mineralised with iron pyrites, with slate as the general country rock; and some 50 feet higher up a drift has been run for 10 feet into a

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*Samples of these dykes were sent to Prof. J. A. Dresser, at Montreal, for microscopic examination, and the following is his report thereon:—

I.

DYKE IN "OLD PUSS" CLAIM, SIWASH CREEK.

In the hand specimen this is a finely crystalline rock, showing no structure to the unaided eye. It is grey in colour, but with numerous flesh-coloured spots, apparently due to some decomposition product. In the thin section it is found to be a rock, which is wholly, but finely, crystallized. The greater portion consists of a fine ground-mass of quartz and feldspar, with a few larger crystals or phenocrysts of feldspar. The dyke with similar characteristics. This dyke appears to follow the trend of the mountain spur, and to cross the north fork of the creek in a north-westerly direction, as on the far side of the creek there is an outcrop of rock, similar although more decomposed, which has been prospected by several short tunnels. Sufficient development work has not been done to show the size of this dyke, and although surface indications promise a large tonnage, the values are admittedly so low that the property will be worked at a profit only by working on a large scale and by careful management.

A ten-stamp mill, supplemented by two Wilfley tables, is being erected on the middle fork, from lumber cut by a small sawmill on the ground, and the stamps should soon be dropping, the power being obtained by means of a Pelton wheel, driven by water from the middle creek under 300 feet head. This is purely a sampling plant, built for the purpose of testing rock encountered in prospecting the property, and does not assume to be in any way a working mill.

The *Ward* is the principal claim in the International Gold Mining Co.'s group, and adjoins the property of the Mount Baker and Yale Company. This claim is situated on the spur between the middle and south forks of Siwash creek, on a sharp ridge about 500 feet above the creek. Here on the surface is a crumbling mass of quartz and rock matter, with rusty quartz predominating, but no extensive body of quartz in place could be seen.

Immediately below this float quartz, a tunnel has been driven into the hillside, running in entirely on the dyke* matter noted on the Mount Baker and Yale Co.'s property lower down. This tunnel appears to be the only development work undertaken by the International Gold Mining Co., which is, however, erecting a stamp-mill, to be driven by a Pelton wheel, for the purpose of testing its ground as prospecting proceeds.

A considerable amount of placer gold has been taken from Siwash creek, but it was derived probably from the degradation of quartz veins in the slate formation, rather than from the larger igneous dykes.

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latter are so turbid in appearance from the alteration which the rock has undergone that it is impossible to say whether they are orthoclase or plagioclase. There are more numerous patches of chlorite and epidote, with grains of iron ore, in this slide, probably representing a primary bisilicate mineral. Spots of some carbonate, apparently dolomite, are also present.

The rock is an altered porphyry or porphyrite, probably the former. The distinction between these two classes depends on the character of the feldspar, which, as pointed out above, could not be definitely determined.

II.

DYKE ACROSS THE NORTH FORK OF SIWASH CREEK.

In the hand specimen this rock differs from the last only in having a reddish colour and showing specks of pyrite.

In the thin section also this rock is found to be similar to the last. It, however, contains many rusty spots, due to the oxidation of pyrites, and has also a more pronounced porphyritic structure, showing numerous well-defined phenocrysts of orthoclase, but none of quartz. There is, however, less basic material present than in the last. It has been crushed and sheared by subjection to pressure after its solidification.

It is a quartz-porphyry.

The above rocks strikingly resemble many of the copper-gold bearing volcanics of the eastern townships of Quebec. They are but slightly differentiated phases of a common magma, such a degree of differentiation in these rocks frequently taking place within a distance of a few feet.

SIMILKAMEEN MINING DIVISION.

REPORT OF HUGH HUNTER, MINING RECORDER.

I have the honour to forward the annual mining report on the Similkameen Mining Division for the year 1904.

The past year has been most favourable for placer mining, but little was done, as the Chinese population has dwindled down to a very few of the old hands.

At the mouth of Bear creek three Chinamen took out some gold and platinum, and it is reported that they got a nugget valued at $120. In that vicinity some valuable nuggets have been found at different times in past years.

A few Chinese were mining on Granite creek, but they did not reap the golden harvest they expected.

I have not much development to report on mineral claims, the owners satisfying themselves with doing the necessary assessment work.

The Boulder Mining Company, Limited, extended its working tunnel 100 feet, and is now applying for Crown grants for all of its holdings.

On Bear creek, Charles F. Law and partner have done considerable work on the *St. George* and *St. Lawrence* mineral claims, and have exposed a vein 5 feet wide, carrying high-grade gold ore. This vein has been traced for several claims. The *Liverpool*, *London*, *Chicago* and *Morning Glory* are adjoining claims on the same lead.

On Roche river and Summit camp assessment work only has been done.

It is reported that the *Sunset* mineral claim, and ten adjoining claims, situated on Copper mountain, have been bonded through the agency of the Bank of Montreal, Nelson, and that 5 per cent. of the purchase price has been paid to the owners.

On Copper and Kennedy mountains assessment work has been done on the claims not Crown-granted.

On Granite creek a free-milling ledge was found some two years ago, the owner of which has done considerable work stripping the ledge, and has started a tunnel.

OFFICE STATISTICS—SIMILKAMEEN MINING DIVISION.

Free miners' certificates	137
Location records	262
Certificates of work	373
Conveyances	69
Certificates of improvement	38

Revenue.

Free miners' certificates	$ 838 75
Mining receipts, general	2,384 20
Mineral tax, etc	1,698 25
	$4,921 20

The following additional notes, relating to claims in the Aspen Grove Camp, and in the Similkameen Mining Division, have been submitted by Mr. George Murray, Deputy Mining Recorder at Nicola :—

Aspen Grove Camp.

In the Aspen Grove Camp work has been confined chiefly to requisite assessments, and scarcely a claim has been allowed to lapse; while several new locations have been made, and the claim-holders have every confidence in the future of the camp.

Several groups of claims have been Crown-granted, and others are in course of development, so that the actual amount of work may not exceed that of former years.

On the *Boomerang* group of six claims, prospecting was carried on in the form of cross-cutting and sinking small trial shafts, the aim being to disclose the probable extent of the ore body, which is large.

On the *Sovereign Group*, consisting of seven claims, sufficient work has been done to allow application for Crown grants. Mineral showings on this group disclose high-grade ore, such as native copper, gray copper and copper glance. The largest continuous piece of work is a tunnel 50 feet long, which will be extended until the larger ore-body is reached. Cross-cutting and sinking have been carried on extensively on this group of claims. The same company owns the *Bighorn* and *Liverpool Groups*, on which assessment work has been done, with gratifying results.

An assessment was performed on the *Golden Gate* by A. Carrington, and on two adjoining claims by their owners, J. E. Bate and W. A. Dodds. Application has been made to Crown-grant the *Golden Gate*. This claim shows good mineral in large quantity, and offers a splendid site for tunnelling. Messrs. Roberts, Budd and Aldous have a group of six claims, on which a considerable amount of prospecting has been done in the way of tunnelling, cross-cutting and trial shafts, with the result of good exposures in native and gray copper.

Mr. Allan, a veteran prospector, who is upwards of 70 years old, and Augstadt, his partner, have worked the greater portion of the summer on their groups of claims with excellent results. On their *Pearl Group* there is an incline shaft 30 feet long, from which a tunnel of 40 feet has been run into a deposit of chalcopyrite, which promises to be of great extent.

Work has been done on the *Mountain View* and adjoining claims by Messrs. Assar and Rogers. The *Hattie* and *Copper Jack* have been Crown-granted by Messrs. Wells and Poulinier. Messrs. Lowe and Brown, who have clung tenaciously to the camp, have Crown-granted the *Happy Jack*, *Lottie* and *Lottie Fraction*. The work done warrants the belief that there is a large area of copper producing rock.

Assessments on the *Copper Bell* and *Bluebird* mineral claims show an extensive ledge of mineralised matter, Timbering, which counts for an assessment, has been done on the *Big Sioux*, noted for its fine showing of high-grade copper ore. Work on the *Giant* consists of tunnel extension, on the *Maggie*, of shaft continuation. The *Giant* is said to afford every facility for a quarrying proposition. On the *Fish Lake Group* of four claims, owned by Larsen and Murray, tunnel extension sufficient for four assessments was executed. Two assessments were done by the same parties on their *Wayside Group*. Messrs. Starmalt, Murray and others, owners of the *Bare Mountain Group*, did their annual assessments on the several claims. The *Copper Standard Group* of four claims, owned by Eastwood & Co., is considered the most valuable in the camp. The remaining work done has been chiefly upon individual claims, some of which, if surface indications persist to a material depth, will prove rich in copper.

LILLOOET DISTRICT.

LILLOOET MINING DIVISION.

REPORT OF C. PHAIR, GOLD COMMISSIONER.

I have the honour to submit my annual report on the progress of mining in Lillooet Mining Division during the year 1904.

This year has been somewhat of an improvement on the previous, as some properties that were idle for years are being developed. By an Order in Council, the southern boundary of this division was extended to a line crossing the Fraser river four miles below Foster's bar.

CADWALLADER CREEK.

Mineral Claims.

Very little work has been done on the Crown-granted mineral claims on this creek, and the arrastras, which were operated during the past years on the *Lorne* and *Woodchuck Groups*, have been suspended. The annual assessment work only has been done on the other claims in this camp.

McGILLIVRAY CREEK.

No development, except assessment work, has been done on the different claims on this creek. The Anderson Lake Mining and Milling Company's claims have been bonded to Mr. J. Burley Smith, Mining Engineer, of Montreal, who has also purchased interests in the *White Rose* and *Rosemont* claims and acquired other properties on the creek, so it is expected he will commence development work in the spring.

CAYOOSH CREEK.

A syndicate, represented by Mr. Fred. A. Fenton, in January, 1904, purchased the assets and properties of the Golden Cache and the Toronto-Lillooet Gold Reefs Companies, on Cayoosh creek. Until October 22nd, seven men were employed in prospecting the claims, the main work being done on the Crown-granted *Ample* claim. There, a tunnel was run in 253 feet for the purpose of determining whether or not the deposit of arsenical iron sulphide, that had been opened by the former owners, was continuous with depth. I am informed that the tunnel driven by Mr. Fenton, when driven about 170 feet, intersected one ledge about 7 feet wide, and that the ledge at the end of the tunnel is 32 feet wide between walls. Work on the property has been stopped for the winter months.

The same syndicate has acquired a working bond upon the properties of the Bonanza Mining Company on Cayoosh creek and now has 14 men employed there in development work.

BRIDGE RIVER.

The *Royal Group* of claims, situate near the north fork, which were bonded by Mr. W. W. Brown last year, were developed in a small way, by continuing the tunnel, but, at the time work ceased, the ledge had not been struck.

TAYLOR'S SANDSTONE QUARRY—SATURNA ISLAND.

NEWCASTLE ISLAND SANDSTONE QUARRY—NANAIMO M. D.

GOLD DREDGING LEASES.

Placer Claims.

The Iowa-Lillooet Gold Mining Company, Limited, commenced dredging on its lease on the Fraser river on the 21st March, and continued running until 21st December, with a force of 10 men. Soon after the dredge was put in operation, some of the parts continued breaking, resulting in great loss of time in procuring duplicates from the East. Not a month passed without work being suspended for repairs, sometimes a couple of weeks being lost waiting for renewal parts, so the output of gold, although considerable, was not as large as expected. The dredge, when working, paid very well, proving that the bed of the river contains sufficient gold to pay for dredging, and that it can be saved by the appliances used on this dredge. No doubt, with the experience now gained, the wearing parts of the dredges next built here will be stronger.

No other dredging leases have been worked.

HYDRAULIC LEASES.

No work has been done on the 14 leases at Bridge river, belonging to the Bridge River and Lillooet Gold Mining Company, Limited. These leases were bonded to the Bridge River Developing Company, but the bond has terminated. I am informed that it is the intention of the owners to resume work on them early in the spring.

The Manager of the Pacific Development and Improvement Company, Mr. W. W. Brown, early in the season discontinued mining on the company's property located on the left bank of Bridge river. He then built a cable bridge across Bridge river, over which he conveyed water to a lease on the right bank, which he mined until near the end of the season. He left the district without informing me of the result.

The *Lillooet* Hydraulic Lease on the Fraser river was worked by six Chinese, as in the past years.

The four creek leases belonging to Messrs. Babb, Walker, Ferguson and Swanson, on Alexander creek, Bridge river, were worked by them in partnership. They diverted the creek and laid 600 feet of flume, 2½ by 3 feet; also built about 1,000 feet of ditch and flume, delivering water under a head of 50 feet. They reached bedrock at the end of the season, and intend putting in a saw-mill and having everything ready to commence taking out gold when the season opens.

At Cayoosh creek, 8 men are engaged blasting a channel through the Falls, and cleaning out an old tunnel, for the purpose of lowering the creek to enable them to mine Mr. J. Jesperson's two leases to bedrock. A great deal of gold, during the years 1887 to 1901, was obtained from this ground by Chinese, but, on account of water, they were unable to mine deeper than about 15 feet from the surface, which did not nearly reach to bedrock. The gold in this creek is very coarse.

The old channel of the south fork of Bridge river, which was struck last year, was mined again this year and about $1,500 in gold obtained.

Last spring was not a profitable one for the Indians and Chinese mining the bars of the Fraser river, on account of the water rising early and covering the pay-gravel, otherwise much more gold would have been added to the output.

The ascertained value of placer gold produced for the year is $23,057, but undoubtedly the itinerant Chinese, mining at the upper and lower boundaries of this Division, sell a good deal of their gold at Ashcroft and Lytton, an estimate of which I have not included in the above amount.

OFFICE STATISTICS—LILLOOET MINING DIVISION.

Mineral claims recorded	45
Certificates of work recorded	56
Conveyances recorded	47
Placer claims recorded	7
" re-recorded	3
Water grants issued	3
Water grants in force	24
Mining leases in force	39
Dredging leases in force	7
Free miners' certificates, personal	114
" " companies	6

Revenue.

Free miners' certificates	$ 995 42
Mining receipts general	5,032 52
Mineral tax	133 25
Tax on unworked Crown-granted mineral claims	322 75
Total	$6,483 94

CLINTON MINING DIVISION.

REPORT BY F. SOUES, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report on mining in the Clinton Mining Division of Lillooet District, for the year ended December 31st, 1904.

Mining in all its branches has been at a standstill, and I have to report no improvement on last year.

The hydraulic leases at Big Bar, referred to in former reports, are worked out and abandoned. Two placer discovery claims were located in that neighbourhood late in the fall, and will be worked next season. The *Rivers Gronp* of mineral claims in the valley of the Bonaparte, for which Crown grants were issued in 1897, have, I am informed, been placed under a working bond, and this has caused a certain amount of activity in recording claims in the immediate neighbourhood.

OFFICE STATISTICS—CLINTON MINING DIVISION.

Mineral claims recorded	34
Placer claims recorded	3
Certificates of work	14
Mining leases in force	4
Dredging leases in force	11
Conveyances recorded	8
Water grants	4

Revenue Collected.

Free miners' certificates	$ 92 50
Mining receipts, general	389 00

VANCOUVER ISLAND AND COAST.

ALBERNI DISTRICT.

ALBERNI MINING DIVISION.

Report of A. L. Smith, Gold Commissioner.

I have the honour to submit my annual report on the progress of mining in the Alberni Mining Division during the year ending December 31st, 1904.

Development has progressed favourably at Uchucklesit harbour and on the Alberni canal. I have to mention the following camps visited by me during the past year. On the *Cascade* mineral claim, at Uchucklesit harbour, owned by the Cascade Copper Mining Co., development work has been carried out this summer, and the showing so far made is very satisfactory. The work done consists principally of a shaft which was sunk 27 feet, connected with an adit level 50 feet long, driven for drainage purposes, giving a total depth of 40 feet. A trial shipment of 93½ tons of mixed ore, sent to the Tacoma Smelting Company, yielded a net smelting return of $1,992.34. The manager reports that, when writing, there was 8 feet of chalcopyrite in the shaft. The shaft is situated at an elevation of 325 feet above deep tidal water. A gravity, three-rail tramway, some 600 feet in length, brings the ore to the bunker, at the wharf.

The *Southern Cross* and *Ballarat* mineral claims, situated at Uchucklesit harbour, are owned by T. D. Conway and others. The work done consists of an open cut 30 feet into the hillside, and a tunnel at the end of the cut 30 feet in length. The open cut was all in ore, showing high-grade chalcopyrite, carrying silver. A shipment of the ore, consisting of 329 tons, was made to the Ladysmith smelter.

Another tunnel was run lower down, the mouth of which is close to the bunker. At 206 feet in, a spur of good ore was struck, and at 220 feet the main ledge was tapped, at a depth of 173 feet.

The *Happy John Group* of mineral claims is situated on the north side of the Alberni canal. The group has been surveyed and two of the claims were Crown-granted. Work has been in progress on this property since May 1st, 1904, with very satisfactory results. About 175 feet of tunnelling was done, and good ore was met with in two of the tunnels at considerable depth. Assays made of ore from both tunnels yielded from 9.4 to 24.7 % copper with small values in gold and silver.

Some important discoveries have recently been made on the *Monitor* property. A well-defined lead of copper ore has been found at the water's edge on the *Monitor No. 1 Fraction*. This is one of the best showings yet found in the district, and of the greatest importance, for it has the appearance of a strong lead of good ore. The same lead, it is thought, has been found on the opposite side of the canal on the *Gladys* mineral claim. A very strong band of limestone lies to the south of the lead.

On various claims in the division the annual assessment work has been done. The indications are that the Great Central lake country, in the interior of the island, will receive considerable attention from prospectors during the coming year.

OFFICE STATISTICS.—ALBERNI MINING DIVISION.

Free miners' certificates issued	60
Mining claims recorded	27
Certificates of work recorded	90
Bills of sale recorded	20
Certificates of improvements issued	2
Rentals for mining leases	7

Revenue.

Free miners' certificates	$ 379 00
Mining receipts (general)	1,689 85
	$ 2,068 85

CLAYOQUOT MINING DIVISION.

REPORT OF W. T. DAWLEY, MINING RECORDER.

I have the honour to submit my annual report of mining operations in the Clayoquot Mining Division during the year 1904.

I had expected quite an improvement would take place this year, but regret to say my office receipts and the general work are a long way below the average.

Most of the mineral claims have had the annual assessment work done on them.

The *Indian Chief Group* at Sidney inlet, owned by Messrs. Dewdney and Springett, of Victoria, are the only claims in the district that had any actual development work performed. Men were at work on this group for several months, and 100 tons of ore was shipped to the Ladysmith smelter, returns from which were highly satisfactory. The ore being packed down to salt water by horses, the bad weather starting in closed these claims up for a while. The owners of the property intend to construct an aerial tramway in the spring.

The Elk River District during the year has received considerable attention from mining men, and some options, with the object of purchase, are now pending. Work on some of the claims will start early in January.

As such a small amount of work has been done during the past year it is hardly worth while enumerating the various claims.

I trust that the coming year will do much to open up and determine the value of the many prospects in the Clayoquot Mining Division.

OFFICE STATISTICS—CLAYOQUOT MINING DIVISION.

Free miners' certificates issued	33
Mineral claims recorded	19
Certificates of work recorded	73
Bills of sale, bonds, etc., recorded	20
Certificates of improvements issued	*Nil.*

Revenue.

Free miners' certificates	$153 00
Mining receipts general	282 60
	$435 60

QUATSINO MINING DIVISION.

Report of B. W. Leeson, Mining Recorder.

I have the honour to submit herewith my annual report on the mining industry in the Quatsino Mining Division for the year ending December 31st, 1904.

The cessation of work at the *Yreka* mine, in the early part of the year, has caused some depression in the district, and little prospecting has been done during the season.

The owners of all the mineral claims, with a few exceptions, have done their assessment work, and in some instances have developed some promising property, particularly that of the *Red Rock* and *Edison* mineral claims. During the season the division has been visited by a number of experienced mining men, who all comment on the large surface showings on the different claims, and regret the lack of work on the showings of ore to prove their depth.

The sixteen claims of the Yreka Copper Co. have been Crown-granted during the year, as has also the *June Group*, controlled by the Copper Mountain Mining and Development Co.

Quatsino King and White Quartz.

This property, owned by Messrs. Nordstrom and Sorenson, is situated about one mile up the Teta river, and has received considerable development since the visit of the Provincial Assayer last season, a tunnel having been run in for about 50 feet, showing a continuation of the lead downwards as was expected.

On the *Red Rock* claim, one of the *Paystreak Group*, owned by Messrs. Cramer and Pollock, a well-defined lead has been shown by an incline run down on the ore for 20 feet. This incline was abandoned and a shaft sunk 40 feet further on which found the ore. The ore gives fair assay values in gold and copper, some zinc being also present.

Edison.

On this property a tunnel has been run in for 80 feet under the showing of ore above. At 50 feet in the ore was struck and cross-cut for 30 feet, a clear hanging and foot-wall being found. The average ore is low in value, but the sorted ore will pay to ship. Drifting and sinking on the lead will now be done to see if a better grade of ore cannot be found.

June Group.

There has been no additional work done on this property since last year. According to Prospectus No. 3, just issued by the company, an agreement has been signed by Messrs. Grant and Lippy to do 1,800 feet of underground work on the group as soon as a certain mortgage on the property is paid.

The limonite and bog iron claims on the West arm, owned by Messrs. Hick and Frank, have received their assessment work, but no extensive development has been done.

Coal.

It is reported that a Mr. Pearson, of Vancouver, with three others, arrived by a recent steamer at the West arm to bore for coal, but the extent of their intended operations has not been ascertained.

Zinc.

It is also reported that the *Peerless* and adjoining claims have been secured by a Kansas zinc company for development.

Office Statistics—Quatsino Mining Division.

Mineral claims recorded	26
Certificates of work recorded	65
Free miners' certificates (individual)	29
Free miners' certificates (company)	1
Conveyances and other documents of title recorded	19
Certificates of improvement recorded	21

Revenue.

Free miners' certificates	$241 25
Mining receipts general	342 55
Fees for Crown grants passing through office	400 00
	$983 80

NANAIMO DISTRICT.

NANAIMO MINING DIVISION.

REPORT OF MARSHAL BRAY, GOLD COMMISSIONER.

I have the honour to submit herewith my annual report on the mining operations in the Nanaimo Mining Division for the year ending the 31st of December, 1904.

There were 472 mineral claims in good standing at the end of the year, and while less locations were recorded during 1904 than in previous years, more development work has been done and recorded, giving in many instances very satisfactory results. The great difficulty is that many of the properties are handicapped by the fact that the owners have not the means to do the development work which the showings really deserve.

The mines of Vancouver Island and the Coast have made a very good showing during the past year, as the returns from the Tyee smelter at Ladysmith show. The following is the record of the work done, viz.:—

Furnace record from 1st January, 1904, to 31st December, 1904:

Furnace in blast 267 days of 24 hours each.

Smelted—Tyee ore,	57,450 tons.
" Custom ore,	7,953 "
Total smelted,	65,403 tons.

The custom ore takes in the ore from the *Van Anda* mine, on Texada island. The *Marble Bay* mines shipped part of their ore to Tacoma for treatment.

Total value of the above ore smelted, less refining charges only, was $831,902.41.

All the ore smelted by the Tyee smelter was from Vancouver Island and Coast mines, with the exception of 1,274 tons of foreign ore, and this marks another step in the progress of mining enterprise on Vancouver Island. Already, ores from many properties are brought to the Tyee smelter for treatment, and will be handled during the coming year in increasing quantity, as the development work on the mines of Vancouver Island and the Coast has established their permanence.

TEXADA ISLAND.

The *Marble Bay* mines, belonging to the Tacoma Steel Co., under the management of A. Grant, have produced and shipped during the year 13,249 tons dry weight. The development work done for the year consists of sinking the main shaft 100 feet, and drivings on 360, 460, and 560-foot levels, 450 feet (lineal). The 560-foot level is 515 feet below high-water mark. The new plant installed comprises one 100 horse-power boiler (new), one new station pump, capacity 16,000 imperial gallons per hour, one electric light plant, costing, including buildings and connections, over $6,000. The average number of men employed for the year was 52 white men and 12 Chinese ore sorters. The gold and silver values have been maintained with depth, and the copper values have improved.

The *Van Anda* properties, held by the Van Anda Copper & Gold Co., Limited, under the management of G. L. Mackenzie, have shipped during the year ending the 31st of December, 1904, 3,539 tons. The development work done was: 480 feet of drifts, 60 feet of winzes, 35 feet of raises, and 44 feet of cross-cutting. Plant installed: a gravity tram connecting the *Copper Queen* with the main line from the *Cornell* mine, and a link-motion hoist installed at the *Copper Queen* mine. The average number of men employed during the year was 30 white men and 12 Chinese.

The Puget Sound Iron Company's mines did not ship any ore during the year 1904; but they have done development work in driving an open cut into the hill 113 feet, to open a large deposit of iron ore. The number of men employed for the year was five.

The Cordillero Mining Company has been steadily developing its properties, having run a tunnel upwards of 200 feet, and also done some cross-cutting. An automatic ventilating plant for their tunnel has been installed.

The *Loyal Group* is being developed by a Seattle syndicate, under a bond from Mr. Treat, and the showings are very favourable. Many other claims have had considerable development work done on them during the past year, and the coming year promises to be a prosperous one for Texada Island. During the past year, only assessment work was done on the mineral claims situate on Phillips and Frederick arms, Thurlow, Valdes and other islands.

OYSTER DISTRICT.

The Vancouver Island Exploration and Development Company, Ltd., has been steadily developing its group of claims in Oyster district, under the management of Mr. H. Cecil, and has shipped 40 tons of ore to the smelter at Ladysmith, and built 2 miles of waggon road to connect the mine with the E. & N. Railway at Brenton's crossing. The development work at the mines consists of the upper tunnel (cross-cut) being driven 64 feet, and drifted west on the ledge 64 feet; lower cross-cut tunnel 120 feet; drifted west on ledge 72 feet, and driven east on ledge 40 feet. The ledge shows a bornite about 2 feet in width, and the property promises well. The average number of men employed for the year was 7.

Considerable work has been done on several other claims in this district, with favourable results.

DUNSMUIR DISTRICT.

The Nanaimo Jubilee Mining and Development Co., Ltd., has been developing its *Delphi Group* of claims in Dunsmuir district during the past year, having sunk the shaft 70 feet and opened up a fine body of copper ore. These claims and the *Jubilee Group* of claims owned by this company could ship ore steadily if they had a branch line of railway to the E. & N. Railway, and it would require a branch only of about 16 miles to tap these mines and the mines on Mount Mystery.

Considerable work has been done on other claims in this district, revealing some very good showings.

The owners of claims have done development work in Bright and the northern part of Cowichan lake districts during the past year, and they are very well satisfied with the results.

The mineral claims recorded during the year ending the 31st December, 1904, are situate in the following places throughout the Nanaimo Mining Division, viz. :—

Texada island	83	claims recorded.
Valdes island	7	"
Thurlow and Hansen islands	2	"
Pearse island	4	"
Cracroft, Deer and Savary islands	3	"
Fort Rupert	3	"
Theodosia arm	1	"
Phillips arm	5	"
Knights inlet	2	"
Beaver harbour	6	"
Menzies bay	1	"
Powell and Horn lakes	2	"
Oyster district	12	"
Dunsmuir district	6	"
Bright district	3	"
Cowichan lake district	3	"
Total	143	

OFFICE STATISTICS—NANAIMO MINING DIVISION.

Free miners' certificates issued, individual	233
" " companies	6
Mineral claims recorded	143
Certificates of work recorded	260
Certificates of improvements recorded	25
Crown grants applied for and issued	25
Bills of sale recorded	31
Permissions given to re-locate	4
Rental mining lease	1

The revenue collected for the above free miners' certificates and mining receipts generally, for the year ending the 31st of December, 1904, was $2,875.25, being considerably less than has been collected in previous years.

STONE QUARRIES OF THE COAST.

REPORT BY H. CARMICHAEL, PROVINCIAL ASSAYER.

Along the Coast and the islands of British Columbia there is an immense quantity of good building stone, but none of the quarries have been worked to any great extent and all are in an undeveloped condition. This is, of course, due to the fact that a demand for their output in the erection of stone buildings has only recently sprung up. In such quarries as have been opened up, operations have been carried on in a more or less primitive manner, and the work has been done for the most part by hand, the "Knock system" of blasting being employed. This system consists of boring a series of deep holes into which a V-shaped rimmer is driven, the V's all having the same general direction. The holes are loaded with a light charge of powder and fired simultaneously by electricity, thus effecting an even fracture of the rock. With an increased demand for building stone, these methods will, no doubt, be replaced by others, less crude and more ecomomical.

HADDINGTON ISLAND STONE QUARRY.

Haddington Island is situated near the north-eastern coast of Vancouver Island, in Broughton strait, and about four miles east of Alert Bay. The island, which is about half a mile long and about the same width, is in the route of the regular coastwise steamers.

GRANITE QUARRY, GRANITE ISLAND, NEW WESTMINSTER M. D.

ANDESITE QUARRY, EAST WORKINGS, HADDINGTON ISLAND, NANAIMO. M. D.

Its geological formation is entirely composed of igneous rock, being an andesite. The highest point of the island is about 300 feet above sea level. On the north and west sides the slope to the water is gradual, but on the south and east is a little more abrupt, being at an angle of about 30°.

The stone is rent almost vertically by cooling fractures, which appear in the main to radiate from a common centre, while here and there the rock is again fissured by cross fractures.

At the south-eastern end of the island two quarries have been opened up, only a short distance apart. Work has been commenced at the water's edge, the quarry face being gradually pushed back. In the eastern quarry, from which the larger quantity of stone has been taken, the face is 32 feet high and 180 feet long, and is 41 feet back from the water's edge. The main cooling fractures have a dip of 80°, and a strike of N. 60° W., into the hill, and although there are other irregular cooling fractures throughout the rock, large blocks of good building stone are to be obtained. From the smaller or southern quarry, which was first opened up, a considerable quantity of stone has been taken, and the face is now 25 feet high, with a length of 230 feet, and is 40 feet back from the water. The "Knock" system of blasting has been used here. The stone from both quarries is a light gray andesite, almost white in colour, and contains very little iron. It is of fine grain and compact texture, and being highly silicious, should stand the weather well.

This Haddington island stone was exclusively used in the superstructure and carvings of the Provincial Government Buildings at Victoria.

Although this stone requires a little more care in dressing than does sandstone, its fine appearance and durability, taken in conjunction with the shipping facilities of a quarry where the rock can be loaded directly into scows, ensures a large market for the product of the Haddington island quarries.

Following is an analysis of stone from the Haddington island quarries:—

Silica	70.5 %
Alumina (with a little iron)	18.7 %
Lime	2.7 %
Magnesia	trace.
Alkalies	not determined.
Loss on ignition	.8
	92.7

BEAVER COVE MARBLE.

Beaver cove is situated on Broughton strait, on the north-eastern coast of Vancouver Island, some five miles south-east of Alert Bay. Here, on the north side of Beaver creek and about a mile from salt water, there is a bluff of marble rock, 200 feet in height, extending for about half a mile up the creek, and from this point some twenty years ago shipments of marble were made, but no regular quarrying has ever been done. Samples of this marble are of a bluish colour, and although the stone is somewhat granulated on the surface, it would possibly assume a more compact texture if quarried below the range of surface influences. This marble bluff is on land owned by Eustace Smith, of Beaver cove.

SATURNA ISLAND STONE QUARRY.

This quarry is situated on the southern extremity of Saturna island, in the Gulf of Georgia, and is owned by Mr. George Taylor, who resides on the property. The southern end of Saturna island rises abruptly from the sea, and is composed entirely of sandstone, interbedded with conglomerate, the strata dipping northerly into the island at an angle of 29°, with a slight tilt to the east. The quarry is on the water's edge, and there is no regular working face, the stone being taken out along the bedding planes at different levels wherever rock occurs of the particular size and colour desired. The stone is of two colours, buff and blue-gray, the former being uppermost, is of fine grain, and free from "shakes," or any considerable quantity of iron, and should make good durable building material. The quarrying is done by the "Knock" system of blasting. In calm weather the stone can be loaded directly into scows. Some 30,000 cubic feet of building stone has up to the present been taken from the quarry, the latest building constructed from Saturna island stone being the Carnegie Public Library at Victoria.

GABRIOLA ISLAND STONE QUARRY.

Building stone has for a number of years been quarried from the north end of Gabriola island. The quarry now being worked is easily accessible from Nanaimo, from which it is distant three miles by water, and is operated by Messrs. Kelly and Murray, of Vancouver. The shipping facilities are excellent, the quarry being on the edge of deep water. The quarry has at different times been worked for a distance of 400 feet along the water front, the present working face being 75 feet long, 28 feet high, and 27 feet back from the water's edge. An upper layer of sandstone from 30 to 40 feet thick extends the whole length of the quarry, dipping, at the north-eastern end of the workings, 14° to the north-east. This layer of sandstone is underlain by a small stratum of argillite, and this again by smaller seams of sandstone. In the middle and on the western end of the thick sandstone seam, quarrying has been suspended, partly on account of hard lumps or nodules which are encountered, and also because of the height of the face above the water. The latter difficulty is overcome at the north-eastern end of the quarry, where the present workings are, by the dip of the sandstone stratum, and although twistings and hard nodules occur there in places, very massive blocks of stone are to be obtained from this part of the quarry. Some two years ago a quantity of stone was taken from a point 200 yards east of this, where there is a face 180 feet long, by 40 feet high, and 40 feet back from the water, but these workings have been abandoned. The stone which is at present shipped is of a blue-gray colour, rather coarse, and contains grains of mica and hornblende.

The Gabriola island quarries have furnished stone for the construction of the Post Office, Victoria, and the McKinnon and Flack blocks, Vancouver. The quarry equipment consists of three large derricks, a hoisting engine, and a short piece of track by which the stone is conveyed to salt water.

BRIGGS PORTAGE QUARRY.

This quarry is situated at Jack's Point, in Nanaimo harbour, about two miles from the town of Nanaimo. The work of opening up had been in progress only two months when the quarry was visited, but a face 50 feet high had been exposed, and a considerable quantity of stone was ready for shipment. The stone is a sandstone, similar to that quarried at Gabriola island, and is dark blue-gray in colour, weathering to a slightly lighter shade, rather coarse-grained, and containing specks of mica and hornblende. Large blocks of stone are obtainable, for the handling of which an excellent derrick is in position. The quarry is on deep water and the loading is done directly on to scows.

NEWCASTLE ISLAND QUARRY.

This quarry is situated on salt water on the western side of Newcastle island, in the north end of Nanaimo harbour, and is owned by the North-western Construction Company of San Francisco, of which the representative in British Columbia is John G. Davis, who resides at the quarry. The stone is a light gray sandstone, and lies in nearly flat strata, with a small dark streak running through it, and is apparently composed of a granitic sand. There is a solid stratum some 16 feet thick, from which very large blocks can be quarried. The Mint in San Francisco, built in 1870, was constructed from Newcastle island stone, and about 1,000 tons were shipped this year by schooner to that city. This quarry also furnished stone for the construction of the Bank of British North America and the Bank of Montreal, in Vancouver.

There are a number of places in the neighbourhood of Nanaimo from which stone has been quarried in small quantities, but no regular quarries have been opened up.

GRANITE ISLAND QUARRY.

Granite island lies off the mainland shore of British Columbia, at the mouth of Jervis inlet, 60 miles north of Vancouver. The island is about half a mile long and a quarter of a mile wide, and is composed entirely of massive gray granite. The quarry is at the south end of the island, on deep water, the stone being loaded on to vessels from an inclined tramway by which it is brought down from the face. The main working face is from 80 to 100 feet above the sea, and is 168 feet long, showing at one point a depth of 26 feet of solid granite. It has been worked back 47 feet from the water's edge. Although at this point the cooling fractures are somewhat irregular, they are generally vertical, and very massive blocks can be got out. To the west of the quarry the cooling planes are more regular, and have a general dip of 12° westerly (*see* accompanying cut). The quarrying is done entirely by hand.

Nelson island, which adjoins Granite island, formerly supplied the demand for granite, but was abandoned a year ago in favour of the latter island, where the quarries are more easily worked. With the exception of the small amount obtained from boulders, all the granite used on the coast of British Columbia has been quarried from these two islands, and shipments are now being made to Seattle. The Granite island quarries are worked by Messrs. Kelly and Murray, of Vancouver.

TEXADA ISLAND.

Marble has for some time been known to occur on Texada island, fine specimens of black marble having been obtained from the north end of the island. Samples of red marble have also been obtained, which when polished had a very handsome appearance, and a body of this material has lately been located by Mr. Alex. Henderson.

WEST COAST OF VANCOUVER ISLAND.

Marble has been found at various points on the West coast of Vancouver island, notably on Barkley sound and at Nootka, the samples from the latter place being very fine. While some of the West coast marbles are nearly white, they are generally of a faint blue-gray colour.

VICTORIA DISTRICT.

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VICTORIA MINING DIVISION.

REPORT OF GRANVILLE CUPPAGE, MINING RECORDER.

I have the honour to submit herewith the annual report on mining operations in this Division for the year 1904.

I have to thank Mr. E. J. Hearn, of Duncans, for the interesting report on the Tyee and other claims in the Cowichan and surrounding districts.

MOUNT SICKER.

Tyee Mine.

The operations at the *Tyee* mine have been most successful this year. From the 1st January to 31st December, 1904, the Tyee Copper Company's smelter at Ladysmith has been in blast 267 days of 24 hours each, and has smelted 57,450 tons of Tyee ore, and 7,953 tons of custom ore, making the total ore smelted 65,403 tons. The product from this was 6,025.688 tons of copper matte, containing 5,120,870 pounds of copper, 179,769.19 oz. of silver, 11,088.830 oz. of gold. Total value, less refining charges only, $831,902.41. From October, 1902, when the shipping of ore to the Ladysmith smelter commenced, to this present month of December, 110,000 tons of ore have been shipped, and there is still a large tonnage of ore in sight in the mine, and several hundred feet of unexplored country from the eastern stopes to the east boundary line of the Tyee Company's property. Heavy development work has been carried on throughout the year, and the main shaft has now attained a depth of 600 feet, and will soon be carried down to the 1,000-foot level. The development work of the past year has demonstrated that, instead of the ore being carried in disconnected lenses, it is in one ore-body. Taking the *Lenora* and *Tyee* as geologically one mine, this means an ore-body of at least 2,400 feet in length, and which, to the shallow depth already explored, will probably yield a quarter of a million tons of ore.

A hoisting engine, boiler and compressor has been installed on the *X. L.*, which is part of the Tyee Company's property, and a two-compartment shaft has been sunk to the depth of 150 feet. Extensive cross-cuts and drifts will be run from this shaft to thoroughly explore the ground, which is south-west from the *Tyee* mine and on the direct run of the lode.

The Tyee Copper Company has paid dividends to the total amount of 20 per cent during the present year, and the directors are following the wise and conservative course of building up a large reserve fund. A large sum has been expended on capital account, in adding to buildings and machinery at both mine and smelter, thus increasing the efficiency of the works. All of this has been paid for out of profits.

VANCOUVER ISLAND MINING AND DEVELOPMENT COMPANY, LTD.

This London company owns a large tract of mineral land to the east of the *Tyee*. A complete mining outfit has been installed on the *Westholme*, comprising hoisting engine, boiler and compressor plant, and a two-compartment shaft has been put down to a depth of 500 feet. The rock is hard diabase, and so far nothing of importance has been discovered.

RICHARD III. MINING COMPANY, LTD.

The *Richard III.* mine closed operations last spring because of insufficient working capital, and the directors do not consider it advisable to make any heavy sacrifice at the present time to obtain the same, owing to the fact that strong companies are working each side of them on the lode. When work was discontinued, ore was showing strongly on the floor of the 500-foot workings, and was apparently rising up from the as yet unexplored depths of the *Richard III.* and *Tyee* mines.

KOKSILAH AND COLVIN MOUNTAINS (Koksilah River).

A fair showing of copper ore has been uncovered on the *King Solomon* claim, from which two small shipments have been made to the Tyee smelter, Ladysmith, with satisfactory results. A number of claims have been staked in the district during the year, but very little work has been done beyond the necessary assessment work.

RICHARD MOUNTAIN.

On the *Ironclad* claim near Westholme, on the E. & N. railway, owned by Mr. Bevan, a good body of heavily mineralised schists has been discovered, and the claim, which is being worked privately, looks very encouraging.

RENFREW ~~DISTRICT~~.

Mr. J. J. Baird, of Port Renfrew, reports that there has not been the usual stir in mining during the past year, but the work accomplished has been very satisfactory.

On the *San Juan Iron Group*, managed by Mr. H. E. Newton, 114 feet of cross-cutting was done on the lead, and all in good iron ore, and another tunnel has now been started.

Messrs. Bentley and McGregor have done considerable work to prove the continuance of the immense surface body of ore on the iron claims in which they are interested, on Bugaboo creek. The San Juan Mining Co., holding a number of claims in the district, has kept its men employed during the past year, and intends shortly to make a shipment to test the value of the copper ore.

OFFICE STATISTICS—VICTORIA MINING DIVISION.

	1903.	1904.
Free miners' certificates issued	667	561
〃 〃 (special)	16	9
Mining claims recorded	150	125
Placer 〃	4	....
Certificates of work issued	344	235
〃 improvements issued	59	28
Grants of water rights for mining	4	1
Conveyances recorded	114	62
Abandonments 〃	....	1
Placer leases issued	3	1
Permits recorded	6	1
Lay-overs 〃	2	....

Revenue.

	1903.	1904.
Free miners' certificates	$5,518 75	$4,821 95
Mining receipts, general	3,878 85	1,526 75
	$9,397 60	$6,348 70

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VICTORIA MINING DIVISION.

NOTES BY W. F. ROBERTSON, PROVINCIAL MINERALOGIST.

SOOKE COPPER PROPERTY.

The following is from a Report by W. M. Brewer, on a copper property at East Sooke, owned by H. B. Thompson and others, of Victoria:—

Claims—Area, Location.

The Sooke copper property comprises six full-sized mineral claims and one fraction. These are known as the *Golden Thrush*, *Willow Grouse Fraction*, *Willow Grouse*, *Blue Bird*, *Donaldson*, *Jack* and *Sydney* mineral claims. The total acreage comprised within the boundaries of this group of claims is approximately 300 acres. This group of mineral claims is located on the Sooke peninsula, about 25 miles distant from Victoria by waggon road, and about the same distance by water. The group is admirably situated when the transportation facilities are under consideration, because the main workings are within about 3,000 feet from a point in Sooke harbour, where vessels can lie at anchor, well sheltered from storms, while receiving or discharging cargoes. The difference in elevation is about 300 feet between salt water and the point where the chief workings have been carried on at the mine. A gravity tramway, with an easy grade, could be constructed at a low cost, by following the course of a ravine which extends from the present mine workings to salt-water, and at the point where this ravine forms a junction with the shore line, there is a splendid opportunity to construct bunkers and a wharf, so that all the material handled from the mine could be delivered on board a vessel with the least possible manual labour.

Geology.

The Sooke peninsula is made up entirely of igneous rocks belonging to the Vancouver Series, as described by the late Dr. Dawson. Evidently this peninsula was the scene of very heavy volcanic disturbances, which have been followed by the formation of mineral-bearing zones of considerable extent, in which have been deposited bodies of chalcopyrite, pyrrhotite and iron pyrite. All the rocks observed by the writer belong to the hornblende or pyrexene series, and in the areas mentioned are found to occur as masses and crystals disseminated through a highly basic intrusive rock, which in several places on the peninsula occupies fissured zones, through which there have been considerable shearing movements subsequent to the eruptive action which produced these fissured zones, as is attested by the numerous slicken-sided cleavage planes, but not sufficient to produce well-defined schistosity. So far as at present known, the most pronounced of these zones occurs in the property described in this report. This is easily traceable for a long distance on the *Blue Bird* and *Willow Grouse* mineral claims, where its boundaries on either side are well-defined and persistent, and are found to be composed of a coarsely-grained granitoid rock, which should probably be classified as a syenite.

Characteristics.

At a point close to the No. 1 stake of both the claims mentioned, the first discovery of an outcropping of chalcopyrite was made. This discovery was followed by a serious attempt on the part of the owners to determine the extent and probable permanency of the ore-body. This has determined several important characteristics of the main ore-body. The occurrence of a fissured zone fully 100 feet in width and of undetermined length has been fully established. Within this zone occur not only several extensive lenses or pockets of high-grade chalcopyrite, but the green basic rock, which is really the matrix of the ore, is found to be thoroughly impregnated with masses and grains of chalcopyrite deposited as sheets and elongated kidneys.

As already stated, the full extent of the zone has not yet been determined, but where the main work has been carried on the width of ore-bearing ground opened up is fully 50 feet. This has been exploited by actual openings for a length of 150 feet, while about 500 feet in a south-westerly direction down the ravine there is exposed in a shallow open cut the same character of ore-bearing material showing chalcopyrite as impregnations. Northerly from the main workings these surface indications, where such are exposed, show the green basic rock which fills the fissured zone where the ore-body has been opened, as well as the well-defined boundaries on the hanging and foot-wall sides, clearly indicating that the zone maintains continuity in that direction for a considerable distance. The dip of the hanging-wall is almost vertical at the surface, the slight inclination there is being towards the west.

So far as the writer could see, the true foot-wall, while being generally well-defined, has not been exposed in any of the workings, but is situated about 40 feet easterly from the shaft which has been sunk at the edge of the ravine. That the lenses of solid ore in this zone possess extent is demonstrated by the fact that the main showing of ore, which carries from 11 to 18 per cent. copper, as exposed in a deep open cut and shaft, is upwards of 70 feet in length, with solid ore still showing at the north end of the cut, and from 4 feet in width at the end to about 11 feet in width at the south end. Surface stripping beyond the deep part of the cut at the north end show that the lenses occur lying in echelon to the one referred to, and these show an aggregate width of nearly 15 feet.

At the southerly end of the open cut a vertical shaft has been sunk 50 feet in ore, and a cross-cut tunnel has been driven from the bottom towards the hanging-wall, or western boundary of the ore-bearing zone. At the time of the writer's examination, he was unable to make any inspection of these workings, because they were full of water and he had no facilities at hand to pump it out, but during the progress of sinking the shaft in 1902 he made two visits to the property, and saw that the shaft was being sunk in ore. As the cross-cut through had not been made at that time, he is unable to describe the condition from personal knowledge. On information, and judging from the material on the dump, it would appear that this cross-cut had been driven a portion of the distance through solid ore, and all of the distance where solid ore was not encountered through the green basic rock, which is the matrix of the ore, and a large portion of which carries sufficient ore as impregnations to give it commercial value.

Developments.

The work of development has been confined to the open cut and shaft, with cross-cut from the bottom, together with several shallow prospecting pits and some surface stripping. As a result of the main workings, a dump containing probably 400 tons of chalcopyrite ore has been accumulated, which, judging from the samples taken by the writer at various times, will yield an average value of 10 per cent. copper, with low gold values. The length of the deepest part of the open cut is about 70 feet, and surface stripping has been done for a distance of about 50 feet in addition, thereby exposing ore at the particular point for a distance of 120 feet. Southerly from this cut, shallow pits have been made, exposing ore a further length of probably 30 feet, while another shallow pit, sunk in the ravine about 500 feet distant from the main workings, also exposes ore.

Conclusions.

After having made a careful examination of this Sooke copper property and also other deposits on the Sooke peninsula, which have been in the past prospected as iron properties, it is the opinion of the writer of this report that the Sooke copper property is a prospect possessing great possibilities, and meriting a most thorough exploitation and development. With regard to the so-called iron-ore deposits, the writer is of the opinion that they have no value when judged on their possibilities for producing iron ore of a commercial grade, but that when considered from the standpoint of their possibilities of developing into copper propositions, on the theory that the so-called iron ore is merely an iron capping covering a deposit of ore (copper ore), the writer is of the opinion that they also merit further and systematic exploitation.

There is every facility for carrying on mining operations on the Sooke copper property as economically as can possibly be done in other sections of the Province, when it is considered that this is a sinking proposition, but owing to the possibilities of extent of the mineral-bearing ground, and the character of the rock, it will very probably be shown that the "glory hole" system of mining could be adopted, and a great saving in cost for the timbering thereby made.

The cost for transportation from the mine to salt water by means of a well constructed tramway should not exceed 10 cents per ton, while the cost for transportation to either of the British Columbia smelters on the east coast of Vancouver Island should not exceed 50 cents per ton.

The following analysis of an average sample from the dump, taken by Mr. D. W. Moore, ore-buyer for the Canadian Smelting Works, of Trail, shows that the ore is practically self-fluxing, and, consequently, could be smelted at as low a cost as is possible:—Gold, .03 oz. per ton; silver, trace; copper, 11.1 per cent.; iron, 15.7 per cent.; silica, 49 per cent.; lime, 2.8 per cent.; sulphur, 13 per cent.

MANUFACTURE OF PORTLAND CEMENT.

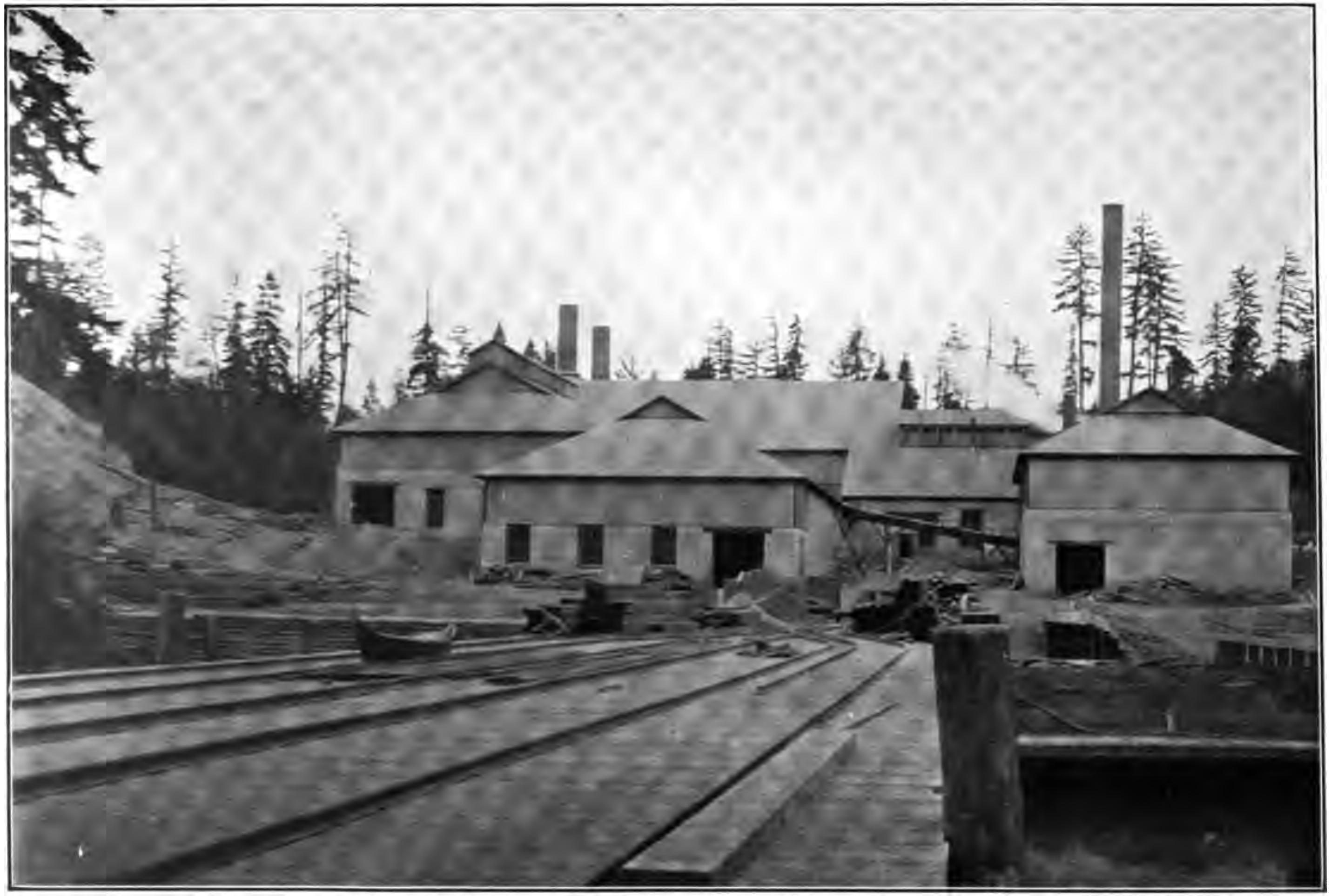
One of the greatest disadvantages that the mineral industry of the Province has been labouring under is that practically there is little or no home market for, and consequently little or no home manufacture of, products, in a merchantable form, from the minerals (other than coal) of the Province. The result has been that in British Columbia there have hitherto entered into the category of "valuable minerals" only such as were rich enough to stand the heavy cost of transportation to eastern markets.

The establishment, therefore, at Tod Inlet, near Victoria, of a cement manufacturing plant which will make a valuable product out of the formerly valueless limestone and clay, of which there is more than a sufficiency, is noted as a matter of more than usual importance to the mineral industry, and as a pioneer enterprise which is sure to bring in its wake similar, if not allied, manufactures. The success of the enterprise is largely assured by the personnel of the company, who are not amateurs in the business, but men who have for years been successfully engaged in the same class of manufacture in Ontario, and who, before embarking on this new enterprise, have brought their Eastern experience to bear on a quiet but thorough investigation of the natural deposits and the facilities, and also of the probable market for the finished product.

The Vancouver Portland Cement Co. is a limited liability company, registered in British Columbia, with a capital of $500,000. The president of the company is Mr. E. R. Woods, of Toronto, who is also a director of the Grand Trunk Pacific Railway, of the Crow's Nest Pass Coal Co., etc., etc. The managing director is Mr. R. P. Butchart, who formerly acted in the same capacity with the allied cement companies at Shallow lake and Lakefield, in Ontario, and the treasurer is Mr. H. A. Ross. The company has taken an office in the Board of Trade building, Victoria, which will be made the head office of the company.

Location of Works.

The plant is located on the shore of Tod Inlet, a branch of Saanich Arm, and is distant from Victoria by waggon road about 13 miles, and from Keating, a station on the V. & S. Railway, about 2½ miles. Transportation of the product will be exclusively by water, the facilities for which are of the very best, as the waters of the Saanich Arm and of Tod Inlet are deep, and navigable by any sea-going vessel, and, being sheltered, admit of scows being used with safety.



VANCOUVER PORTLAND CEMENT CO.'S WORKS, TOD INLET VICTORIA M. D.

The factory buildings are about 100 feet from the shore of the inlet, into which a pile wharf, about 36 feet wide, has been run out for about 200 feet. This wharf is most substantially built, and is arranged to receive two scows on either side, while the end is provided with an adjustable apron to connect with car-transfer scows, from which the railway cars can be run directly into the works to be loaded or unloaded, standard gauge tracks having been laid for this purpose. The level of the wharf is about 5 feet lower than the floor of the shipping room, bringing this floor and the car platforms on a level.

Raw Materials.

The raw materials used in the manufacture of the cement are limestone and clay. The limestone forms a ridge running parallel with the water front and about 100 yards back of the factory buildings. The limestone quarry has been opened up at such a level as to give a slight down-grade track to the factory bins, the bottoms of which are higher than the crushing plant. To reach the quarry, an open cut about 200 feet long, and some 20 feet in depth at the deepest point, has been driven through clay which overlies the flank of the limestone, and this clay forms the other ingredient in the manufacture of the cement, so that both the raw materials are found at the proper elevation, within 100 yards of the bins, and are both delivered over the same tram track. The only preparation the lime or clay quarries required was the stripping of a few feet of surface soil with its forest growth, so that (as will be seen) the occurrence of the raw material is as nearly as possible ideal.

The lime quarry was being opened up by two men with a steam drill, the steam being supplied from the factory boilers. The face at present is about 40 feet long and can be extended either way for an indefinite distance, while the height of face can eventually be made about 40 feet above the track level. The lime rock is a blue-gray crystalline limestone, of which the following is given as a general analysis:—

Carbonate of lime	96 to 99 %
Silica	0.3 to 2 %
Alumina and iron	.15 to 1 %
Magnesia	trace to 0.3 %
Sulphuric acid	trace

The clay deposit extends from the lime quarry down to, and covers the site selected for, the works, the supply being practically unlimited. The following is given as the analysis of the clay:—

Silica	60 to 63 %
Alumina and iron	25 to 28 %
Lime carbonate	3.75 %
Magnesia	trace to 2 %
Sulphuric acid (about)	0.29 %
Alkali	trace to .75 %
Moisture and organic matter (about)	5.75 %

These materials are used in the proportion approximately of three of clay to one of limestone.

Plant.

The factory buildings are five in number, so grouped together as practically to form one; as in some instances the dividing walls consist of pillars only. The walls of all the buildings are of lime concrete about 15 inches thick, the lime having been burned on the spot in an old lime-kiln built by the former owners. To these walls an outer coating of cement will ultimately be given. The roof trusses are of wood, with iron tension bolts, while the roofs are boards covered with malthoid, a prepared roofing felt. The concrete walls are about 20 feet high, and in these buildings where the process creates much dust, are surmounted by a wooden framework about 8 feet high, filled in with wooden lattice work between the concrete wall and the wall plate, thus securing ample light and ventilation, the projection of the eaves being sufficient to prevent rain from entering.

The plant has been laid out on what is known as the "level site" principle, as distinguished from the "successive bench" plan; that is, the working floors are all on the same level, for the sake of compactness, the material being elevated by mechanical means between the successive stages. The exception in this case is that the stock-room is at a level 10 feet lower than the factory floors.

Following the line of the process, the first building is entered from the end, at about the level of the eaves, by the tram-line from the quarries, which tram-line runs directly over the limestone and clay storage bins. The bins are not much used at present, as the source of supply is so very convenient that the raw material is taken directly from the quarry to the crushing plant. The bins, however, serve for holding a reserve for night work or bad weather.

The preliminary crushing plant consists, for the limestone, of a Gates crusher, the top, or feed end, of which is set just below the floor level of the bins, and which discharges into a "rotary dryer," a hollow wrought-iron cylindrical shell 5 feet in diameter and 42 feet long, set on tires, with a slight inclination down from the feeding end, so that by the revolving of the cylinder, the crushed material travels through the dryer and is automatically discharged. Through the "dryer" is conducted a portion of the hot waste gases from the "rotary kiln" (described later), the amount taken being regulatable by dampers. These gases pass into the lower end of the dryer, meeting the crushed material and drying it, and pass out of the upper end into a separate stack.

The crushed and now thoroughly dried limestone is discharged from the "dryer" into a screw conveyor, which carries it horizontally, underneath the floor level, to the boot of a bucket-elevator, by which it is raised and deposited in the feed bin of a "Krupp ball mill," into which it is automatically fed. This "Krupp ball mill" is a horizontally-revolving iron shell, about 6 feet in diameter and 6 feet long, lined with a heavy chilled-iron screen, into which is fed the partially crushed limestone. In the mill there are a number of round steel cannon balls which, as the mill is revolved, roll over and through the crushed limestone, gradually grinding it until it is fine enough to pass through the enclosing screen, which in this case is 100 meshes to the lineal inch, and is then discharged through the end of the cylinder.

From the Krupp mill the now finely ground limestone, practically a dust, is discharged directly into a bucket-elevator, by which it is raised and deposited in the "ground limestone stock-bin," the bottom of which is some 8 feet above the floor level, and which has a storage capacity of about 50 tons of crushed limestone.

The clay is received over the same tramway as is the limestone, being dumped into the bin or fed direct to a "Potts disintegrator," practically a pair of rolls and revolving knife-like teeth, which thoroughly disintegrate the clay. From here it passes into the same "dryer" into which the limestone was fed, and which is used, as required, alternately for limestone or clay. Leaving the "dryer," the clay is found to be so finely divided as not to require to be passed through a Krupp mill, and is elevated directly to the "ground clay stock-bin," a companion bin to that in which the ground limestone was stored, the two being located side by side. At this point the materials, which so far in the process have been treated and handled separately, are mixed.

In front of both the ground limestone and ground clay stock-bins, and set on the general floor level, is an automatic weighing scale, so constructed that it can be set to receive a definite weight of ground material, and by the adjustment of these two scales any desired weight of limestone or clay is weighed off and gradually discharged from both scale hoppers into one horizontally placed screw conveyor, in which the two ingredients are thoroughly mixed and conveyed to an elevator, and so raised and deposited in an elevated hopper bin, from which by gravity the now mixed materials are fed down into two "tube" mills, in which they are still more fully incorporated and ground.

These "tube" mills, as the name implies, are iron tubes made of boiler plate, about 5 feet in diameter and 22 feet long, set horizontally on rollers so that they may be revolved at a speed of about 25 revolutions a minute, by power applied through a cogged tire fitted around the tube. This tube is lined with very hard, tough, cut flint stones, imbedded in cement, the lining having a thickness of several inches. Inside the mill, and loose, are a number of larger round flint pebbles, which, as the tube is revolved, roll over and through the ground limerock and clay, fully mixing and more finely grinding them, the now thoroughly ground and mixed material being discharged at the lower end of the tube mills into a common screw conveyor, and so carried to another elevator, by which it is raised and deposited in a hopper bin, located above the end of the "rotary kiln," into which they are fed by gravity.

This kiln is an iron tube 7 feet in diameter and 70 feet long, lined with firebrick, set nearly horizontal (¾in. to 1 foot) and mounted on rollers, and so arranged that it can be revolved by power. As the cylinder is revolved, the slight inclination given to it gradually carries the material charged in at its upper end to the lower end, where it is finally discharged, dropping through a chute into the boot of an elevator. The interior of the kiln is maintained at a temperature of about 2,700° F. by the combustion of fine, dry coal dust, so fine as to act as a gas, which is fed into the cylinder by a blast of air. The preparation of the dry coal dust will be described later.

The gases from the kiln are led by a flue to a large central stack, large enough and provided with openings for one or two additional kilns, for which latter there is room in the building. A portion of these hot gases, as already mentioned, is conducted through the "dryer" and provides sufficient heat to dry the material.

The particles of the finely crushed limestone and clay fed into the upper end of the kiln are, in their slow passage through this fiery furnace, cintered or fused together, forming what is known as "cement clinker," which, when pulverised, is cement. This red-hot clinker discharged from the kiln is raised by an open link-belt bucket-elevator to the level of the walls of the building and shot down a wrought-iron tube to the "rotary cooler," which is a revolving iron cylinder about 5 feet in diameter and 50 feet long, set with a considerable inclination. Through this cylinder a draft of cool air is induced, which so cools the clinker that it comes out of the lower end of the "cooler" at a temperature sufficiently reduced to permit of its further handling. As the cooled clinker drops from the "cooler," any large clinkers are automatically screened out and broken by hand.

At this point about 1 % of gypsum is added, for the purpose, it is said, of making the subsequent cement set a little more slowly. This gypsum is at present imported from the Central Western States, as none is as yet being mined in the Province.

From the "cooler" the clinker drops into an elevator and is deposited in an elevated hopper bin, from which it is automatically fed into a "Bonnet" ball mill, 5 feet in diameter and 8 feet long, which is, in principle, similar to the Krupp mill already described, where it is partially crushed. From the "Bonnet" mill the material is conveyed by a screw conveyor to an elevator, the discharge from which is led into a "tube" mill, similar to the two already described, from which it is discharged, crushed, 95 % of it, to 100-mesh size, as a finished product, and is finally conveyed by a belt conveyor to the stock room, where it is deposited in bins ready for sacking and subsequent shipment. The sacks each hold 87½ lbs., that is, there are four sacks to the "barrel."

Power.

The power-house is a building separate from, but adjoining, the factory, and having cement concrete walls and partitions separating the engine and boiler rooms. Steam is generated in a battery of five tubular boilers, fired partly by wood and partly by slack coal. The engine is a 600 horse-power, compound Corliss, made by Goldie & McCullough, of Galt, Ont., and is supplied with condenser, pumps, feed water heater, etc. While at present power is generated by steam, it is the intention of the company to operate eventually by electric power, to which end a water power of 2,000 horse-power has been secured at Sooke—about 10 miles distant—where a generating station will be built and the electricity conveyed across country to the works at Tod inlet.

Coal Grinding Plant.

Adjoining the engine and boiler-house is a separate building, about 50 feet by 80 feet, in which the fuel for the kiln is prepared. About half of the building is given up to coal stock bins, into which the coal—slack coal or culm—is to be conveyed by a belt conveyor directly from a scow alongside the wharf. From these bins the culm is taken by a link belt elevator to a Bartlett rotary cylindrical dryer—essentially an inclined, revolving, iron cylinder, about 5 feet in diameter and 20 feet long—heated externally underneath by a fire-box using both wood and coal. The slack coal is delivered by the elevator mentioned into the upper end of this cylinder, and in its passage through the heated cylinder is thoroughly dried. The dried culm is then conveyed to a Raymond 3-roll mill, a circular iron pan in which, revolving around a central axis, are three rolls—very much on the principle of the Huntingdon mill—which crush the coal until it is fine enough to be carried off by an exhaust draft, and so conveyed to an elevated iron tank in the kiln building, from which it is fed as required into the kiln by a blast of air.

Capacity of Plant.

The plant as at present completed has a capacity of 300 barrels of Portland cement a day, and with the increased machinery, for which accommodation has been provided in the present buildings, this capacity can be doubled at short notice. In April, 1905, the first shipment of the product of the works was made, by the barge "Alexander."

Quality.

The only tests that the product of the mill could have been subjected to at this early date are laboratory tests, but such are the tests by which the quality of cements are gauged. It is understood that the Canadian Government standard for neat cement briquettes is that they shall have, after 7 days' setting in water, a tensile strength of 450 lbs. to the square inch section. The product of the Tod inlet works is reported by the company's chemist, Mr. Heiberg, to have an average tensile strength, after setting for seven days in water at the temperature of the air, of 700 lbs. to the square inch, and even after setting for only two days, to have a tensile strength of 400 lbs. A number of briquettes tested on a Fairbanks cement tester in the presence of the writer came fully up to the averages given, while one briquette, which had set for ten days, successfully resisted a tension of 1,000 lbs.

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NEW WESTMINSTER MINING DIVISION.

NOTES BY W. F. ROBERTSON, PROVINCIAL MINERALOGIST.

BRITANNIA MINE.

The immense deposit of copper-bearing schists constituting the *Britannia* mine, on Howe Sound, has been known, and its extent well authenticated, for several years, and a very full description of the property and its exposures of ore was given in the Report of this Bureau for 1900. While the importance of the deposit has for some time been fully realised, the scale upon which it must necessarily be worked to secure the best economic results was so large, and demanded the outlay of such a large amount of capital, that only within the last year have operations leading to the actual exploration of the property been begun.

The property is held now as in 1900 by the Britannia Copper Syndicate, Ltd. The name of the company remains the same, although the personnel has changed largely, owing to transfers of interests to capitalists already interested in copper mining in Montana and elsewhere, whereby working capital was secured.

The officers of the company are: President, Hon. Edgar Dewdney, Victoria, B. C.; Secretary, J. W. Lee, Britannia Beach; Managing Director, Geo. H. Robinson, Britannia Beach; Engineer, C. W. McMicking, Britannia Beach.

The Provincial Mineralogist visited the property on November 1st, 1904, and found in process of construction what promises to be one of the largest concentrating plants in British Columbia, the completion of which must have a powerful influence upon the mining development of this section of the Province. At the mine it was found that very little development of the ore-bodies had been made since the property was previously reported on, which fact must not be taken to imply that this important matter has been neglected, but rather that the development of 1900 was so satisfactory as to justify, without further work, the present large expenditure being made for plant. The importance of the enterprise and the fact that the Report of 1900 is now out of print, seem to make it necessary to repeat from that Report some of the description then given, which description still holds good.

The *Britannia Group* is situated at an elevation of about 3,500 feet above and 3.8 miles from deep salt-water, on the eastern shore of Howe Sound, and is about 28 miles distant to the north from the City of Vancouver. The present examination was confined to the actual underground workings, which are fairly described in extracts from the report of the former managing director, which is quoted later. These workings are sufficient to satisfy anyone that there is here an immense zone in the schists which has been impregnated with an appreciable amount of copper, constituting an exceedingly large, low-grade concentrating proposition of very great importance, and requiring a very extensive plant and a large amount of capital.

The following has been extracted from a report made by the late managing director of the syndicate, Mr. C. E. Walters, under whom the developments were chiefly made:—

"*Claims, Area, Title, etc.*

"Seven claims, the *Fairview*, *Edith Fraction*, *Jane*, *Clifton*, *Heather Fraction*, *William* and *Mineral Creek*, containing 297.04 acres and covering over 8,500 feet of the lode, on its strike, are included in the *Britannia Group*. The title is absolutely perfect, Crown grants (the equivalent of U. S. Patents), having been duly obtained from the Government.

"NOTE.—Under the law of the Province a full-sized mineral claim is 1,500 by 1,500 feet square, all lines descending vertically, thus summarily disposing of the vexatious 'apex' question.

"*Vein Characteristics, Etc.*

"The Britannia claims are traversed by a lode, or zone, of schistose silicious ore, 300 to 600 feet wide, impregnated with copper and iron pyrites and enclosed by a green, porphyritic rock on the south, and black slate on the north, the general strike being north-west and south-east, with dip to the south. Locally, this feature is known as the 'Britannia mineral zone,' and has been definitely traced for several miles in either direction from the *Britannia Group*, which appears to occupy the central position.

"*Ore Disclosures.*

"*No. 1, Jane, outcrop and open-cut.*—Near the western end of the *Jane* claim are the *Jane* original workings. At this point the leached, silicious outcrop has been broken into by occasional shots and surface trenches for over 80 feet in width by 250 feet in length, revealing copper and iron pyrites in the schistose-quartz; also massive yellow-copper (chalcopyrite); samples of this outcrop yielding 4 to 13 % copper, with $1.50 to $2 in gold and silver per ton. On the north or foot-wall slope of this outcrop, an open cut, 15 feet wide by 20 feet high on the upper side, has been driven 60 feet, following the strike, entirely in copper-gold ore averaging by careful, repeated independent sampling over 5 % copper, with $1.75 in gold and silver per ton, while much of the ore exposed on the hanging side of the cut, where chalcopyrite occurs most generously, will average 8 % copper, and may readily be graded by rough-hand selection to 15 %. The highest copper results obtained in the open-cut referred to range from 15 to 25 %, large blocks of the massive yellow copper being tried.

"*No. 2, Jane, cross-cutting and drifting.*—About 100 feet (vertically) below the *Jane* open-cut a cross-cut, prospecting tunnel has been driven 215 feet, entirely in low-grade, mineralised, vein-matter, which may be treated when the property is equipped on a scale proportionate with its known large ore-bodies, but to which no attention has yet been given. Continued to the hanging side of the lode, this tunnel will open large bodies of ore visible on the surface. One hundred and fifty feet from the mouth of this cross-cut, a drift has been run west, turning gradually to the south until, at 100 feet from the initial point, the ore-body was encountered and a 26-foot cross-cut was driven, entirely in massive ore, 20 feet of which will average better than 5 % copper with $1.75 gold and silver, the remainder averaging 8 %, much clean chalcopyrite occurring on the hanging side in a continuous streak of 2½ to 4 feet, clean blocks of which carry 15 to 25 % copper, with the accustomed amount of gold and silver per ton. East and west drifts having been run from the 26-foot cross-cut on this ore-body, a combined distance of 138 feet, its continuity has been proven for that length, at an average depth of 130 feet from the surface, and, despite the fact that at this level the evidences of local disturbances are plentiful, permanence of the ore-body is well assured. Although these workings were started in the *Jane* ground the west drift has penetrated the *Clifton* over 100 feet, and stands at present for the only development, aside from a short, open surface-cut, on the *Clifton* claim.

"*No. 3, Mammoth Bluff outcrop.*—East of the *Jane* workings previously described, a small basin of erosive origin occurs, about 900 feet across, at the eastern extremity of which a great body of silicious ore is visible in the form of perpendicular bluffs, shaped like a huge, recumbent letter **Z**, 600 feet long, and having an average visible height of 200 feet from the exposed base, and an average visible width of 150 feet, all of which has been very conclusively proven to be pay-ore of most remarkably uniform general character, this having been determined by a 91-foot tunnel, driven crossing the ore-body at about 45°; a 17-foot cross-cut and by 24 shots, exposing a 45-foot vertical face of live ore; also a succession of shots, intended to be 20 feet apart, along the entire length of the great ore outcropping at its visible base, all of the workings and every effort at investigation of this phenomenal ore-body being entirely in ore, no bands of waste or intrusion of any character having thus far been encountered. Sampled and re-sampled by independent examiners, a fair exhibit of values present in this great ore-body, as indicated by the average results obtained from the working exposures, viz.: the 91 and 17-foot tunnels and the 45-foot vertical face, is,—Gold, 095 oz.; silver, .55 oz.; copper, 3.84 %. This ore being very silicious, the pyrites finely distributed, will require water concentration, with fine grinding, and tests made indicate 6 to 1 as a satisfactory basis, if the concentrates were to be sold at a custom smelter, or 4 to 5 tons of crude ore to 1 ton of concentrates, if the product were to be smelted on the ground.

"The visible tonnage in this body of ground, 600 feet long by 200 feet high by 150 feet wide, has been estimated by various examiners at 1,800,000 to 3,000,000 tons; the owners' estimate, upon which 'a guaranty of $5,000 was given, that $10,000,000, gross value, would be found in sight,' was based upon 1,500,000 tons of $7 (or better) ore in sight, and this guaranty they were not obliged to pay.

"As this ore-body may be worked as an open quarry for many years, since from the eastern end of the *Mammoth* ore outcrop the vein-matter forms a huge 'hogback' over 400 feet through at the base, and extends, continually rising, over 1,700 feet, to the eastern end of the *Britannia Group*, the mining costs may be reduced to the very minimum, and the daily tonnage output will, from the start, be limited only by the will of the operator and the capacity of the equipment provided.

"*No. 4, Fairview showings.*—From the *Mammoth Bluff* outcrop, through the *Edith Fraction*, and cutting the *Fairview* from end to end, is the huge ridge, or "hogback" of outcropping vein-matter referred to in the preceding paragraph. Leached and weathered on the surface, often to great depth, investigation of this claim has, thus far, been confined to surface prospecting, with most satisfactory results; on and along both slopes of the outcrop good ore has been broken into in numerous places, across over 400 feet in width, a continuous "chute" of high-grade ore coming to the surface for some 300 feet along the northern slope.

"That the *Britannia* lode is continuous, going eastward from the *Clifton*, through the *Jane*, *Edith Fraction* and *Fairview* claims, and that the high-grade ore disclosures in the *Fairview* surface openings are not only permanent but of great importance, is underwritten, as it were, by the fact that the owners of the *Empress Group*, adjoining the *Fairview* on the east, near the close of the season—the lode being covered in the *Empress*—succeeded in tracing the lode from the *Fairview* showings, over the divide and down the opposite slope to a point 800 to 1,000 feet below the *Fairview* east end-line, where they uncovered a section of the *Mammoth Britannia* lode and speedily drove a 20-foot cross-cut tunnel in splendid copper ore, a duplicate of the *Fairview* product.

"*General Physical Features.*

"All natural features are as if designed by nature for the operation, at minimum cost, of a great mine. The *Britannia Group* lies parallel to and below the summit of the main range, at an elevation of 3,500 feet above sea level. Britannia creek, the main water-course of the locality, rises east of and flows parallel to the *Britannia Group*, at an elevation of 2,000 feet above sea level, and at a point opposite (below) the *Jane* workings (basin) is 4,000 feet distant, surface measurement, therefrom. (Note.—These figures are approximately correct.) The main feeders of Britannia creek, also, chiefly have their sources in the *Britannia Group*, so that the abrupt descent from the *Jane* claim to Mineral creek, at or near the mouth of Jane creek, some 1,500 feet in 4,000, is all exceedingly favourable either for the development of water-power, the operation of gravity trams, or for access to deep levels of the *Britannia* lode by a tunnel, driven from any desired point above Britannia creek. From the mouth of Jane creek to deep salt water, where any ship may safely land, the grade is less precipitous, admitting of the operation of either waggon or railroad and yet affording sufficient head in feet for two or three additional water-power installations.

" *Water Supply, etc.*

"The local water resources consist of the right, by lease from the Provincial Government, at a nominal rental per annum, to take the water of Britannia creek out of the channel three times (returning and picking it up again after use), between a point above the mouth of Jane creek, affording a head of 500 feet at the latter point, and mouth of Britannia creek at Britannia beach. At all times the volume of Britannia creek is abundantly equal to all ore-dressing requirements, and by estimate will afford 1,000 horse-power, minimum, for four months in the year, and up to 2,000 horse-power or more for the remaining eight months.

"AN AVERAGE ORE VALUE EXHIBIT OF BRITANNIA GROUP DISCLOSURES OF ORE, IN WORKING QUANTITIES, AS DETERMINED BY STRICTLY INDEPENDENT EXAMINATIONS.

"The following results were obtained from samples taken by two visiting engineers, who subjected all of the *Britannia Group* disclosures of ore, in working quantities, to most searching examination *in the interest of their principals;* being wholly independent, the results are worthy of credence and we believe the ore, when worked in quantity, will yield greater values.

"WORKINGS SAMPLED AND CONTENTS PER TON OF 2,000 LBS.—MAMMOTH BLUFF OUTCROP.

	Gold, ozs.	Silver, ozs.	Copper, per cent.
"*No. 1.*—Main Tunnel, 91 feet, driven at visible base of western face crossing ore-body at 45°, five samples along entire length of tunnel; the fifth including 'leached shell' at tunnel mouth, should not be included in average values	.034 .04 .12 .065 .13	.36 .44 .55 .52 .52	2.81 2.73 3.46 2.98 .63
"*No. 2.*—Seventeen-foot cross-cut tunnel at visible base of northern face of outcropping ore, about 125 feet east of *No. 1*	.08 .14	.44 .30	3.16 3.20
"*No. 3.*—Forty-five-foot perpendicular breast of live ore, at 'Water Course,' disclosed by 24 holes drilled and fired by men suspended over face of bluff by rope-ladders, in order that 'leached sheil' might be removed and fact demonstrated that the great *Mammoth Bluff* outcrop is ore from top to bottom, as well as from end to end of the visible dimensions, namely: 600 feet long, 150 feet wide and 200 feet average height, above the level of the main (91-foot) cross-cut tunnel; representing in all, 1,500,000 tons of visible ore...............	.104 .14 .14 .075 .1 .07	.82 .38 .80 .76 .82 .43	4.20 5.40 6.87 5.12 5.80 3.62
"Combined totals, (13)...........................	1.238	7.14	49.98
" Average contents per ton	.095	.55	3.84"

The ore exposures mentioned are all located in the bluffs which surround a basin at the head of Jane creek, and as already noted, little further development has been done on these since 1900. The *Jane* tunnel has been run to a total distance of 360 feet, and the cross-cut therefrom has been extended further, developing the ore already noted. With a view to the active exploitation and treatment of the ore, construction work was proceeding energetically. Elevated trestles were being built connecting both the *Jane* tunnel and the *Big Bluff* workings with a central receiving bin situated at the upper terminal of the aerial tramway.

Trestles.

The *Jane* trestle will be about 600 feet long, with a down grade to the receiving bin of 8½ per cent., whereas that from the *Big Bluff* will be about 640 feet long, with only a slight down grade to the bin. On each of these trestles one or more 10-ton self-dumping cars, operated by wire-rope haulage from an engine, will convey the ore to the central point. Here, it is understood, it is proposed to instal Blake crushers, crushing the ore to say 2 or 3-inch cubes, whence it will pass on to a sorting belt. On this belt the first-class shipping ore and also the waste rock will be picked off, the former going to a special bin and the latter to the waste dump, while the bulk of the ore will be delivered to the receiving bin for transmission by the tramway to the concentrating plant. This receiving bin was nearly completed, and was 60 feet long by 17 feet wide by 20 feet high, built of logs, and has a capacity of about 1,000 tons of crushed ore.

A compressor plant will be installed at the mine, driven by electricity generated at the beach, and transmitted by the three-wire system over a pole line which follows the tram line.

The Tram Line. The aerial tramway will be 16,800 feet long, in two sections, with an intermediate dumping and re-loading or transfer station, at a point where an angle in the line was unavoidable. The upper section will be 5,800 feet long, in which distance it will drop 1,400 feet, while the lower section will be 11,000 feet long, with a drop of 1,800 feet. All the supports for the cables were in place, and the terminals were approaching completion. The pole line was nearly finished, the copper wire being on the ground ready to be strung.

At the Beach. A substantial dock has been built, and a commodious office and quarters for the officers of the company erected, together with a store, hotel, and several private houses. The concentrating plant was under construction, but was not sufficiently advanced for the reception or erection of the machinery. The concentrator building is a large rectangular building—built upon piles at the water's edge—and having two floors, the lower of which will be largely occupied by bins, while the upper will be provided with an extensive equipment of reciprocating tables and slimers. Excavations were being made on a bench about 100 yards from the concentrator, and 100 feet above the sea level, for the crushing plant, which will be capable of crushing 500 tons of ore a day to a fineness of about 40 mesh, the crushed material being conveyed in launders to the concentrator for the separation of the mineral.

The mining and transporting of the ore are straightforward propositions, for which perfectly definite plans can be made, but, from the nature of the ore, or rather from its mode of occurrence, the methods of crushing and of concentration must be, to a certain extent, developed by experiment; and as the plant has not as yet been installed, it is thought best not to enter into a description of plans which may be materially modified, further than to say that the crushing plant will consist of Blake crushers and rolls, to be followed, for finer crushing, by Huntingdon and Chilian mills. The concentrating ore, after the shipping ore has been sorted out, will probably not run over 3 per cent. of copper, contained as chalcopyrite in the quartzose schist. This should produce a concentrate ranging about 15 per cent. copper, which will require to be smelted, and which will, for the present at least, be shipped to some of the coast custom smelters for treatment.

Power. Water for power is to be taken from the creek, the intake being 1,900 feet above the beach, at which point the water-wheels will be situated. The intake dam has been constructed and the grading done for a line of pipe, the upper portion of wood and the lower of steel, which will convey the water to the power plant. The distribution of power will be by rope transmission to the nearer points, and to the mine and points more removed, by electricity.

MOUNT BAKER MINES.

NOTES BY H. CARMICHAEL, PROVINCIAL ASSAYER.

The Mount Baker mines are situated south of Chilliwhack, near the International Boundary, which forms the southern limit of the New Westminster Mining Division. From Chilliwhack the municipal roads are followed south till the Chilliwhack river is reached, where the broad, flat valley of the Fraser is left behind, the trail following east along the north bank of the Chilliwhack through a rugged country, the Cheam range lying to the north, while to the south, across the river, is a rough, mountainous country, with unnamed peaks.

The Chilliwhack is a river of considerable size, and is fed from the south by several fairly large creeks, notably Tamiky and Slesse creeks, which are torrential streams subject to rapid rises and falls. Slesse creek rises some six miles south of the International Boundary and flows into the Chilliwhack river about twelve miles above the municipality, and the majority of the claims in the Mount Baker district are reached by a trail following up this creek from its junction with the Chilliwhack, which river is crossed by a pack bridge. A shorter route than the present (which is about 40 miles), from Chilliwhack to the International Boundary, would be through a pass in the Cheam range to the Chilliwhack river, and thence south. Within half a mile of the International Boundary, a wild mountain stream called Glacier creek, and having its source among the glaciers of Red mountain, falls into Silicia creek from the south-west. About a mile and a half from the Boundary, and east of Slesse creek, is Tamiky mountain, a jagged, irregular peak which is a landmark in the district.

During the mining excitement of a few years ago, some misunderstanding was caused by an observation post placed on Slesse creek when the forty-ninth parallel was first surveyed in 1859-61. The post was taken for a boundary mark, and to ascertain whether certain claims in the neighbourhood were in Canada or in the United States the boundary was re-surveyed in 1901, and is now clearly marked with iron posts, the line being chopped out through the timber.

In 1898 gold-bearing quartz was discovered on the Nooksack river, a few miles south of the Boundary, and from there prospecting has been pushed north into British Columbia; but, with the possible exception of the *Pierce* claims, no mineral in workable quantity has so far been found in the drainage area of Slesse creek. There is, however, a wide range of country still unexplored and unprospected, and the region lying to the east along the Boundary seems well worthy of attention.

About four miles from the Chilliwhack river, on the left bank of the creek and near the point where it is crossed by the pack-bridge, several mineral claims have been located, of which the *Telaca* and *King Solomon* chiefly have been worked. These claims are owned by T. Beaumont, of Sumas, B. C. The mountains here rise abruptly on either side of the creek, and on the left bank a few shots have been put into a zone of contorted slate, slightly mineralised with iron pyrites.

Higher up the mountain, about 70 and several hundred feet respectively, there are two felsitic dykes, also slightly mineralised with pyrites, on which some work has been done. Samples from all of these workings were taken, but upon assay disclosed nothing of value.

The *Queen* mineral claim is situated on Slesse creek, near the mouth of Glacier creek, and is owned by Louis Fromer, of Chilliwhack. A drift has been run for about 20 feet into a zone of altered slate, about two or three feet wide, cut by a felsitic dyke, both being slightly mineralised with iron pyrites. Selected samples from this vein gave only a trace of gold, and two-tenths of an ounce of silver to the ton.

From the mouth of Glacier creek, Slesse creek rises rapidly, and on the right bank, some two and a quarter miles above the bridge, are the *Jumbo* and *Lincoln* mineral claims, owned by Thos. Lay, *et al.*, of Chilliwhack. These claims show generally a decomposed black oxide of iron, in zones of movement in slate, traversed by felsitic dykes, and carry low values in silver, with some copper pyrites. Some 150 feet of tunnel, entirely in country rock, had been run by former owners of the property.

Across Slesse creek from the *Jumbo*, and on the western slope of Tamiky mountain, is the *Tin Cup* mineral claim, the workings on which are 1,000 feet above the creek, and are reached by a steep zig-zag trail. A mountain torrent has here denuded the hillside, laying bare a few stringers of quartz, frozen tight in a granitic formation. These stringers appear, from samples taken, to carry values so low as to make their profitable working improbable. Red mountain is a semi-circle of rock towering high above timber line, its sides being covered with blue glaciers, and its summit crowned with perpetual snow. The oxidation of the iron, with which the rock is mineralised, has stained the mountain side, giving the appearance from which its name is derived. On a spur of this mountain, between Glacier and Slesse creeks, a trail leads to the claims of the Red Mountain Company, half a mile south of the International Boundary. Near a cabin built on a shelf of rock on the mountain side, a tunnel and upraise are being driven, to tap a quartz vein which is exposed higher up the mountain. When the claims were visited the snow rendered this quartz vein inaccessible, but the writer was informed that it was 2 feet wide and carried good values.

There are, south of the boundary line, a number of claims, which, although in American territory, are more easily accessible from Canada, the most notable of these being the *Post Lambert Group*, of which the *Lone Jack* is the principal claim. The *Lone Jack* is situated on the southern slope of Bear mountain, four miles south of the boundary, and while it may be reached from the Nooksack river by crossing a high divide, it is more easily reached from Canadian territory, by a trail following up Slesse creek, which heads among the glaciers of Bear mountain. In the Geological Survey Report of the State of Washington, the *Lone Jack* is described as having a 2-foot quartz vein in slate walls, on which vein a 10-stamp mill has been erected and considerable development work and stoping done, the values averaging $32 to the ton, in free gold and tellurides.

The *Pierce* mineral claims are situated on the western slope of Tamiky mountain, and as they could be reached only by returning down Slesse creek to the Chilliwhack river, and thence making a long detour up Nesaquatch creek, they were not visited. The property is said to have a 4-foot quartz vein, averaging $40 to the ton, with good water power, and it is reported that the erection of a stamp-mill is contemplated.

NEW WESTMINSTER MINING DIVISION.

Report by C. C. Fisher, Acting Mining Recorder.

I have the honour to submit the following report of mining operations in the New Westminster Mining Division for the year 1904.

The claims recorded during the year were distributed as follows:—Howe sound and vicinity, 34; head of Harrison lake and vicinity, 33; Seymour, Lynn, and Capilano creeks, 25; Pitt lake and vicinity, 16; Stave lake and vicinity, 15; Chilliwhack and vicinity, 4; Nelson island, 3; Squamish, 3; Jervis inlet, 1. The claims recorded show a slight falling off, while the development work recorded remains about the same as in the previous year. The only new development work in the district, worthy of special report, has been done by the Mayflower Mining & Milling Company, on the *Mayflower Group* of six mineral claims, which are situate about 1½ miles from the Indian village of Skookumchuck, 20 miles from the head of Harrison lake. The company has spent the sum of $20,000 in developing the claims and in machinery, etc. The ore-body, where it occurs on the *Mayflower*, rises to an elevation of 100 feet above the surrounding country. The vein is strong and well defined, and is heavily impregnated with fine iron pyrites and a little galena and blende, carrying gold and a little silver. From the development work already done, the company estimates that it has 250,000 tons of ore in sight. The development work consists of a main cross-cut tunnel of 160 feet, all in ore, with 100 feet of "backs" and several other drifts in the direction of the vein and shaft. Assays average about $5 per ton. The company considers it a cyaniding proposition, and is conducting tests to prove the extraction of different products. The company has installed a lot of machinery, which consists of a Hendy triple-discharge, 2-stamp mill with 1000-pound stamps, a Blake ore-crusher, and a Challenge ore-feeder, which is used for testing the milling qualities of the ore-body. The company has also erected offices, blacksmith shop, cook and bunk-houses to accommodate 20 men, superintendent's quarters, etc., and has stretched a cable, 300 feet in length, at a height of 60 feet above water, across the river, on which passengers and freight can cross. It intends also to erect a crushing and cyaniding plant, with a capacity of 100 tons a day.

The Britannia Copper Syndicate, Ltd., the owners of the *Britannia Group* of mineral claims, situate on Howe sound, has made considerable expenditure on its properties during the past year. The work consists of a concentrating mill, nominal capacity 500 tons daily, together with an aerial tramway for the transportation of the ore from mine to mill, a distance of about three miles, necessary ore bins, etc. Power is to be generated by means of water wheels and electric generators. A portion of the machinery has been placed, while a portion of it has not yet arrived upon the ground. The plant is expected to be in operation during the early part of 1905.

OFFICE STATISTICS—NEW WESTMINSTER MINING DIVISION.

	1903.	1904.
Free miners' certificates issued	855	673
Quartz claims recorded	173	134
Certificates of work recorded	192	184
〃 improvement recorded	13	7
Conveyances recorded	32	33
Revenue.		
Free miners' certificates	$5,384 85	$4,451 85
Mining receipts, general	2,912 05	1,664 05
Total	$8,296 90	$6,095 90

INSPECTION OF METALLIFEROUS MINES.

REPORT OF JAMES McGREGOR, INSPECTOR, WEST KOOTENAY AND BOUNDARY DISTRICTS.

I have the honour to submit my annual report for the year 1904, with respect to the condition of the metalliferous mines in my district.

SLOCAN DISTRICT.

The mines in the district have done considerably more developing and shipping than during the previous year. I found at all times, when I inspected the mines, care was being exercised in thawing powder, timbering, placing of ladder-ways and landings. The prevailing method of opening mines in this district is by tunnel. The few shafts which are in use are well equipped with safety catches, guides and signals. The bunk-houses appear to be in a sanitary condition.

LARDEAU DISTRICT.

In this district the mines have not increased their output to any great extent during the year, owing to several causes, the principal one being bush fires and snow-slides, which caused serious damage and delay; however, a large amount of prospecting and developing has been done in the district during the year.

AINSWORTH DISTRICT.

In this district there has not been any great increase over the previous year. The two mines which are working are well equipped in every respect.

NELSON DISTRICT.

The mines in this district have operated the entire year with little variation, the latest methods in thawing powder and timbering being used. The bunk-houses, so far as I can judge, are in a good sanitary condition.

YMIR DISTRICT.

The shipping mines in this district have worked continuously during the year. On others than those at present shipping a considerable amount of development work has been done, all of which has been in accordance with the Act.

TRAIL DISTRICT.

In this district several new properties have been opened during the year; also a great amount of development has been done in the older and larger properties, which are now becoming quite extensive. In and around all of these workings, I find the ropes, guides, catches, ladder-ways and machinery in good condition. The timbering also is carefully prepared and placed. The various appliances used for signalling are in good condition, as are the equipments for thawing powder.

BOUNDARY DISTRICT.

In this district, during the year, there has been a number of new mines put in operation, but as yet are not extensive. The older mines have worked continuously with increased force. The greater amount of ore is quarried, but where shafts are in use they are well equipped with guides, safety catches, ladder-ways and signals. The timbering is safely done, where required, and the powder carefully thawed.

I beg to report on the mode of ventilation in all of the districts. With few exceptions, it is natural; in some instances assisted by fans; in others by connecting the different levels; often by upraises or winzes. On the whole, I find it fair.

REPORT OF THOS. MORGAN, INSPECTOR OF EAST KOOTENAY DISTRICT.

I have the honour, as Inspector of Metalliferous Mines for the East Kootenay District, to submit my annual report for the year 1904.

During the year, the following mines have been working:—The *Sullivan* mine, situated on Sullivan hill, near Fort Steele; the *St. Eugene* mine, situated at Moyie, B. C.; the *North Star* mine, near Fort Steele; the *Alice* mine, near Creston, B. C.

Sullivan Mine.

My last inspection of this mine, of which James Finlay is superintendent, was made August 5th. An aerial tramway, 1¼ miles in length, has been built from Kimberley railroad to the mine, and bunkers have been erected at the mine and at the railway. Very little work has been done during the year in this mine, but guides have been put in the shaft and an iron cage put on. This mine is ventilated by natural ventilation.

St. Eugene Mine.

This is a very extensive mine, under the superintendence of James Cronin, manager, and a considerable amount of work has been done during the past year. My last inspection was made September 2nd, when I found everything in good order, and the mine well ventilated both by natural and artificial ventilation. A concentrator, capable of handling 400 tons per day, is installed near the mine, and is run by water power, as is also the electric machinery used in lighting the works. Two hundred and twenty-three men were employed at this mine.

North Star Mine.

This mine, in charge of Neil McL. Curran, superintendent, has been working all the year. My last inspection was made August 3rd, when I found everything in good order and the ventilation good. Twelve men were employed at this mine.

Alice Mine.

My last inspection of this mine (John Hampson, superintendent) was made October 4th, when I found everything in good order and the mine well ventilated. An aerial tramway, one mile in length, has been built from the Crow's Nest Railroad to the mine, and a concentrator has been put in. Twenty-three men were employed at this time.

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1904.

No.	Mine.	Date.	Name.	Occupation.	Details.
1	Le Roi, Rossland . .	Jan. 2	G. T. McKenzie	Miner	Small bone in ankle broken by fall of rock in stope.
2	Centre Star	〃 11	Chas. McPhee	〃	Skull fractured and one eye destroyed. Drilling into old hole containing powder.
3	〃	〃 11	Frank Geddo . .	〃	Killed. Drilled into old hole containing powder.
4	Ruth, Slocan	〃 27	Wm. Estib	〃	Killed by fall of rock in stope.
5	Le Roi	Mar. 9	John Hogan ...	Shoveller ...	Back and ankle slightly bruised by fall of rock in drift.
6	〃	〃 12	J. Misski	〃 ...	Thigh slightly bruised by car in mine.
7	〃	〃 26	John Carlsen . .	Miner	Killed by falling down chute.
8	Old Ironsides ..... (Boundary)	April 7	Peter Carlsen . .	Mucker	Severely injured by falling down timber chute.
9	Peyton Tunnel .... (Rossland)	June 8	L. J. Brimm . .	Shoveller ...	Hand crushed by rock rolling down chute.
10	Le Roi	〃 14	J. A. McLeod . .	〃 ...	Hand crushed by car.
11	War Eagle	〃 14	Jas. Lyon	Blaster	Killed by blast.
12	Centre Star	〃 16	A. Pinkerton . .	Skip tender . .	Killed by falling down shaft.
13	Le Roi	July 12	John Berg	Miner	Ankle slightly bruised by piston pin.
14	Ymir	〃 21	Frank Silveston	Labourer	Six ribs broken and scalp wounds by falling down winze.
15	Le Roi	....	Frank Nicholls	Timberman . .	Foot slightly cut by axe.
16	War Eagle	Aug. 17	Jas. Kalasky . .	〃	Killed in the shaft by being caught between skip and timbers.
17	Knob Hill, Phœnix	〃 31	B. Shartenberg	Nipper	Fatally injured by rock rolling down muck pile.
18	Le Roi	Sept. 3	J. D. Coleman.	Timberman .	Wrist slightly cut through collapse of staging.
19	〃	〃 16	Richard Cooper	Shoveller	Leg and back bruised by car.
20	〃	〃 21	Earl Martin ...	Miner	Thumb cut off by block pulley.
21	Ymir Mine	〃 23	Robert Brown.	Nipper	Killed by cable in ore-hoisting shaft.
22	Le Roi	〃 25	J. A. Anderson	Miner	Head and hand slightly cut and leg bruised by rock falling in stope.
23	〃	Oct. 3	Mike Sado	Shoveller ...	Caught between car and chute, end of little finger taken off.
24	Idaho, Alamo	〃 11	Frank Spits ...	Miner	Killed by drilling into missed hole.
25	Le Roi	〃 13	Wm. Purcell . .	Timberman . .	Collar-bone broken by piece of loose rock falling down man-way.
26	Highlander .... (Ainsworth)	〃 26	Gus Weda	Miner	Bruised by falling rock while timbering.

LIST OF ACCIDENTS IN METALLIFEROUS MINES, 1904.—*Concluded.*

No.	Mine.	Date.		Name.	Occupation.	Details.
27	Le Roi	Nov.	15	Louis Tyckson	Miner	Rock fell on end of pole, which flew up and bruised head and face.
28	Le Roi No. 2......	〃	24	Emil Mikolem.	Top cager...	Killed by falling down shaft.
29	Silver Cup, Lardeau	〃	27	W. S. Laing...	Miner	Killed by fall of rock in the stope.
30	Le Roi...........	Dec.	1	Mike Supple ..	Timberman..	Skull fractured and hip dislocated by falling down timber chute.
31	Old Ironsides ..... (Phœnix)	〃	3	Chas. Johnston	Mucker fore- [man	Severely injured by falling down timber-way.
32	Ymir Mine........	〃	5	Mercer Antler.	Miner	Fatally injured—crushed between car and chute.
33	Le Roi..	〃	10	Britton Duke..	Timberman..	Slightly bruised by machine-drill falling on him.
34	Knob Hill, Phœnix	〃	14	S. Fife	Miner	Severely injured by falling rock in raise.
35	Le Roi.....	〃	17	Wm. Tomkins.	Miner	Slight scalp wound from falling rock.
36	Payton Tunnel .... (Rossland)	Dec.	30	James Brighton	Miner	Finger slightly cut by chute door.
37	St. Eugene........ (East Kootenay)	Oct.	4	O. Paulson....	Mucker....	Seriously injured about the head by the explosion of powder in muck.
38	〃	〃	4	C. McDonald..	Miner	〃 〃 〃
39	〃	〃	4	K. D. Stinson .	Miner	Slightly injured at the same time as above.
40	Tyee, Mount Sicker	Feb.	22	Arch. McPhail	Mucker.....	Serious scalp wound and bruises. Fell from second to sill floor, flooring having been removed and not replaced.
41	〃 〃	May	31	Edw. Mannier.	Mucker.....	Slight scalp wound, caused by being struck by cage in shaft.
42	〃 〃	Aug.	20	John Hooker..	Mucker.....	Fracture of small bone of left arm and bruises, caused by falling into ore-chute.
43	〃 〃	Sept.	1	Wm. Stayner..	Teamster ...	Fatally injured in head by being struck by skid while unloading logs.
44	〃 〃	Nov.	12	D. McAulay...	Miner	Ankle dislocated—foot caught and twisted in loose lagging.
45	Nahmint, Alberni..	Dec.	12	J. McGilvray..	Miner	Fatally injured by drilling into missed hole.

GEORGIA STONE CO.'S QUARRY, JACK'S POINT NANAIMO HARBOUR.

GABRIOLA ISLAND SANDSTONE QUARRY—NANAIMO M. D.

TABULATED LIST OF ACCIDENTS, METALLIFEROUS MINES, 1904.

	CAUSE OF ACCIDENT.	EXTENT OF INJURY.			TOTAL.
		Fatal.	Serious.	Slight.	
A	Blasting	1	0	0	1
B	Defective Powder	0	0	0	0
C	Drilling into old holes containing powder	3	1	0	4
D	Powder in muck	0	2	1	3
E	Shafts and cages, accidents connected with	2	0	1	3
F	Falling down shafts or winzes	2	1	0	3
G	Falling down chutes	1	3	2	6
H	Mine cars	1	0	4	5
I	Rock falling in stopes, levels, etc	3	1	6	10
J	Rock falling down chutes or openings	0	1	1	2
K	Timbering	0	0	2	2
L	Miscellaneous, underground	0	0	4	4
M	Surface	1	0	1	2
	Totals	14	9	22	45
Accidents for each 100,000 tons ore mined		0.959	0.616	1.508	3.082
Accidents for each 1,000 men employed		4.242	2.727	6.666	13.636

COAL MINING IN BRITISH COLUMBIA.

The only coal fields of British Columbia being actually mined for coal are those of Vancouver Island and of the Crow's Nest Pass, and these seem to be more than able to supply the markets at present available, as in neither field have the mines been able to work the year through with a force as great as could have been employed. The gross amount of coal mined in the Province during the year 1904, was 1,685,698 tons (2,240 lbs.), an increase over the preceding year of 203,785 tons. The distribution of this output of coal and of the coke produced is shown in the following table:—

COAL AND COKE PRODUCED, EXPORTED, ETC., BY PROVINCE, 1904.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	537,744	....	....	....	129,337			
" export to U. S.	532,436	....	....	....	100,281			
" " to other countries	1,157	....	....	....	....			
Total sales	....	....	1,071,337	....			229,618	
Used in making Coke	432,070	....						
Used under colliery boilers, etc.	159,651	....						
Total for colliery use	....	....	591,721					
Stocks on hand first of year	8,130	....						
" last of year	30,770	....						
Difference added to Stock during year	....	....	22,640	....	....	....	8,810	
Output of collieries for year	....	....	1,685,698	....	....	....	238,428	....

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &C.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and clerical assistance	89	$6 87	51	$4 50	140	$5 68
Whites—Miners	1,614	3 75	....	....	1,614	3 75
Miners' helpers	1,378	2 75	547	....	1,925	2 75
Labourers		2 87	....	2 50	....	2 68
Mechanics and skilled labour		2 62	....	3 62	....	3 02
Boys		1 87	....	1 33	....	1 60
Japanese	17	1 37	28	1 25	45	1 31
Chinese	180	1 37	549	1 25	729	1 31
Indians	....	....	....	....	....	....
Totals	3,278	....	1,175	....	4,453	....

In addition to the coal fields actually producing, there are a number of others which have been developed to such an extent as to settle definitely the question of their commercial importance.

In the East Kootenay District, large coal fields have been developed on the Elk River, above the junction of Michel creek, and also on one of its eastern tributaries, Fording river.

On the north fork of Michel creek good coal seams have been proved, but little development has taken place this past year.

On the south fork of the same creek there are valuable seams, owned by the Crow's Nest Pass Coal Co., but as this company has at present sufficient openings already accessible by railway, these newer exposures are dormant.

All the above proved fields can be easily reached by railways, which will doubtless be built as soon as there is a stronger market demand for the fuel.

In the Flathead country there has been some active prospecting going on for both coal and oil, but of the success of these operations there is no official information.

In the vicinity of Kamloops some development of coal seams has taken place, as mentioned in the Report of the Gold Commissioner of that District.

In the vicinity of Nicola the known coal fields have been extensively explored and prospected by two or three companies, and according to analyses given elsewhere in this Report, some very good coal has been proved, and the building of the long-expected railway through this section will in all probability lead to the opening up of these fields.

The coal fields of the Telkwa river, a branch of the Skeena above Hazelton, and at least near the line that must be adopted by the Grand Trunk Pacific Railway, were more thoroughly explored and mapped out by Messrs. McEvoy and Leach, of the geological staff of the Crow's Nest Pass Coal Co. Mr. McEvoy reports extensive seams of semi-anthracite found in a nearly horizontal and undisturbed bed, probably formed from beds of bituminous coal acted upon by the heat produced by a very large volcanic overflow deposit of later date. There seems definite promise that these properties will be opened up in advance of the railway mentioned.

Of the coal areas on the Peace river to the east of the Rockies, but well within the Province of British Columbia, there has been little heard this past year, as they are supposed to be upon land "reserved" since Confederation, and from which the Dominion Government has a right to make a selection.

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VANCOUVER ISLAND COLLIERIES.

The output of the collieries of Vancouver Island for the year 1904 was 1,023,013 tons, gross, of which 784,169 tons were sold as coal, 135,034 tons were used under the producing company's boilers, 22,640 tons were added to the stock piles, and 81,170 tons were used in making coke; producing of this latter commodity 19,571 tons, all of which is shown in the tabulated Returns which follow. During the preceding year (1903) the gross output of coal was 860,775 tons, and there was taken from stock some 46,285 tons of coal, so that the consumption of Vancouver Island coal in 1903 was 907,060 tons. The gross output of coal for 1904, therefore, shows an increase over the preceding year of 162,240 tons, an increase of 20 per cent., while the gross consumption of coal shows an increase of 115,954 tons, or 12.7 per cent.

The present output shows a distinct gain, but is not so great as it was two or three years ago, before the invasion of the California market by fuel oil, for California, in 1902, was the market for about three-quarters of the coal output of these collieries, and as the following table shows, still absorbs about 53 per cent. of the coal sold. The following table gives an aggregate summary of the output, etc., for the Vancouver Island and Coast Inspection District as is permitted by section 53 of "Coal Mines Regulation Act." The returns for the individual mines, however, can not be given without the permission of the individual owners, as such is prohibited under the same section, and this permission has been refused by both the producing companies.

AGGREGATE SUMMARY OF RETURNS FROM VANCOUVER ISLAND COLLIERIES FOR THE YEAR 1904.

	COAL.		COKE.	
	Tons.	Tons.	Tons.	Tons.
Sold for consumption in Canada	368,764		10,333	
" export to United States	414,248		2,591	
" " other Countries	1,157			
Total sales	....	784,169	....	12,924
Used in making Coke	81,170			
" under Colliery boilers	135,034			
Total for Colliery use	....	216,204		
		1,000,373		
Stock on hand first of year	8,130	....	631	
" last of year	30,770	....	7,278	
Difference added to stock during year	....	22,640	....	6,647
Output of Collieries for year 1904	....	1,023,013	....	19,571

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC., VANCOUVER ISLAND.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	47	$6 87	37	$4 50	84	$5 68
Whites—Miners	993	3 75	....	....	993	3 75
Miners' Helpers	449	2 75	....	....	449	2 75
Labourers	337	2 87	53	2 50	390	2 68
Mechanics and Skilled Labour	19	2 62	220	3 62	239	3 02
Boys	86	1 87	23	1 33	109	1 60
Japanese	17	1 37	28	1 25	45	1 31
Chinese	180	1 37	525	1 25	705	1 31
Indians	....	....	....	....	....	....
Totals	2,128		886	....	3,014	

INSPECTION OF COAL MINES, 1904.

VANCOUVER ISLAND AND COAST INSPECTION DISTRICT.

(Joint Report of Arch. Dick, Inspector, and Francis H. Shepherd, Acting Inspector, during Inspector Dick's absence.)

The collieries operating during the year were:—

Nanaimo: Western Fuel Company—No. 1 shaft, Protection Island shaft, Harewood mine, No. 4 Northfield mine, and re-opening operations at the old Fitzwilliam mine, which has been closed since 1881.

Extension: Wellington Colliery Company—Nos. 1, 2 and 3 mines, all worked from what is known as the No. 1 tunnel.

Cumberland: Nos. 4 and 7 slopes and Nos. 5 and 6 shafts.

Western Fuel Company.

(This Company has refused permission to publish its Official Returns.)

The Western Fuel Company has been working the following mines during the year, during the first half of the year, under the superintendency of Mr. Thomas Russell, and during the latter half under that of Mr. Thos. R. Stockett as manager and Mr. Thomas Graham as superintendent.

No. 1 Shaft, Esplanade, Nanaimo.

Mr. Joseph Randle and, later, Mr. Thos. Mills, Managers.

The winning drivages of this mine have been extended continuously during the year, the most important levels being Nos. 7 north and south levels, both of which are being driven into new territory. The No. 7 level going to the south is being driven into an entirely unexplored portion of the field, and with very satisfactory and promising results.

The dip workings off No. 3 north level have also been extended and pillars extracted in the upper portion of the section.

The workings up the three main inclines off No. 1 level north have been confined chiefly to the extraction of pillars. Two new winning inclines have been commenced off No. 1 level and are preparing to open out on pillar and stall work.

On May 29th the splendid head-gear and pit-top were entirely destroyed by fire, but fortunately, no lives were lost. With commendable enterprise, the management immediately put the Protection shaft in readiness, and continued to hoist the output from that shaft while the new head-gear and the screening and washing plant were being installed. The new works were re-modelled with an up-to-date installment, of a capacity of 1,500 mine cars in a single working shift. Advantage was taken of the accident to remodel the hoisting machinery and to install a very efficient air compressing plant.

Protection Island Mine.

Manager, Mr. Joseph Randle and, later, Mr. Thomas Mills, with Mr. George Wilkinson as overman.

The operations at this mine have been confined to the extraction of pillars in the upper seam, and to long-wall working in the lower seam. A rock tunnel has been driven to the lower seam to win a larger area and facilitate haulage and ventilation. This seam continues to produce splendid coal, and the management is preparing to open it up at other points of the mine.

NO. 4, NORTHFIELD.

Manager, Mr. George Bradshaw.

This is an entirely new installation and is winning both the upper and lower seams. Parallel slopes have been successfully driven under the channel to Newcastle island, and the lower seam is now being opened up by the long-wall system. The old Fitzwilliam mine is being pumped out, and will be utilised as an air connection, and the old mining area attacked.

Extensive hoisting and screening works are being erected, and substantial wharves and storage bunkers constructed.

HAREWOOD.

Mr. Thomas Budge, Manager.

This mine discontinued operations in the latter half of the year, and at the present time is still closed.

Wellington Colliery Company, Limited.

(This Company has refused authority to publish its Official Returns.)

The Wellington Colliery Company, Limited, has been operating the following mines during the year 1904, under the general management of F. D. Little, M. E. :—

The Wellington Colliery, in Cranberry District (Extension); Andrew Bryden, Manager.

The Wellington Colliery, in Comox District; John Matthews, Manager.

EXTENSION.

No. 1 or Tunnel Mine.

The developing drivages in this mine are confined to the slope to the dip of No. 1 east level. A new motor road is being driven to connect this slope with the main tunnel, and is nearing completion. In other parts of this mine considerable pillar extraction is being done.

No. 2 Mine.

Mr. Alex. Shaw, Overman.

Three pairs of levels are being driven into new territory to the east, and the slope to the dip of No. 4 level is being pushed into the solid. This section gives off considerable inflammable gas, but precautions are used in the district to ensure safety.

No. 3 Mine.

James Sharp, Overman.

The winning drivages of this mine are confined to the No. 3 slope and workings, and to the No. 1 level. Both stall work and extraction of pillars are in operation.

The three mines, collectively, are under the supervision of Mr. Andrew Bryden, and are well ventilated and timbered, and have a capacity of 2,000 tons per day.

COMOX.

No. 4 Slope.

Richard Short, Overman.

This slope is now down 2,500 yards, and work is going on on the west side, in what is known as No. 11 level, with Nos. 1 and 2 inclines from the same. All the workings in this district are in good order, being worked on the pillar and stall system. Ventilation is good. For this district a new return airway has been made to the surface, and a new fan erected, which at the date of inspection was found to be passing 45,000 cubic feet of air, in which current of return air no trace of gas was detected.

To the east side of this No. 4 slope, known as the "diagonal slope," work is going on in the 11, 12 and 13 east levels. All the mining here is confined to extracting pillars (coal), work having been started at the inside, and continuing from there out. In this "diagonal slope" the water that was run into the mine some years ago, when it was on fire, is being pumped out, and it is expected that the coal face will soon be reached. Ventilation was good, the air going in by 13 level and returning by 12 and 11 levels. The company has only recently got the face of the slope, and has started to open out, and, as I have said, the workings are 2,500 yards from the entrance. From No. 4 there is also a slope turned off to the east, which is known as

No. 2 Slope.

This slope, at the face, is the lowest workings in the No. 4 mine, and is badly caved, and there is yet much water to pump, which makes very slow work. The company has now got below the No. 10 east level, which is being cleared and put in order. All the work being done down here is at pillars. Ventilation was very good. From this No. 2 slope turns off what is known as

No. 3 Slope.

All the working here is at the pillars, on both sides of the slope. Including the slope pillars, the coal is now nearly all out up to No. 6 level, where it is proposed to stop for a time when all the workings below No. 6 level will be permanently closed up. Ventilation is very good. This No. 4 mine has given much trouble, the company having been under the necessity of flooding it on two occasions. The water proved very destructive, bringing down the roof and in many cases where the roof did not come down, the floor raised and met it. It will be a long time before No. 2 slope gets to the solid, but in other places the company is in a fair way to get coal out soon.

No. 5 Shaft.

The working of this mine is on the long-wall system, but it is not possible to have the working faces in line, as much trouble is caused by faults. There is plenty of rock to pack solid the workings behind, and in many cases the workings will not hold all the débris, so that some has to be taken out. The districts in this shaft are known as the No. 1 and 2 inclines, both of which are worked on the same principle and under the same troublesome conditions. Ventilation is very good, the air current travelling along the face where the men work.

No. 6 Shaft.

John Kesley, Overman.

This No. 6 shaft is about one mile in a southerly direction from No. 5 shaft, with a roadway under ground between the two mines. All the mining here is on the pillar and stall system. In many places the coal is thin, but the workings are kept in fine condition. Ventilation is good, and conducted well into the face by brattice, and cross-cuts through the pillars. In this mine there is a system of water pipes to the face, or near enough to reach them with a hose. The water can be turned on at any time if the works should be getting dry, or in case of fire, as there are taps at the different ends of the pipes. The water in the pipes is pumped up the shaft, and is under about 500 feet pressure. In this shaft work has been started in what is known as the upper seam, which is about half-way down. This vein is about 7 feet between roof and floor, but contains impurities of various kinds.

No. 7 Slope.

David Walker, Overman.

This is the mine where anthracite coal was reported as found. This slope is now down about 500 yards, on a gentle pitch. The coal is of very good quality, but here, as in the other mines, there have been drawbacks, with faults of one kind and another. There is not much coal being taken out, but preparations are being made for a large output in the near future. There is an air shaft down here which will be between the No. 1 and 2 slopes, and will be the upcast for both slopes.

No 2 slope is only a short distance from No. 1 at the entrance, but goes off at an angle, which widens as they go down. Coal from both slopes will be landed at the same tipple. The works are being put in shape on the surface for the handling of a large quantity of coal. The haulage from the above slopes is to be with a ⅝-inch endless chain, which is now on the ground.

This No. 7 mine is about five miles from No. 5 mine, from which place there is a good railway of the standard gauge, in connection with the company's railway system. I think this mine will be an extensive producer.

The detailed list of accidents occurring during the year is given under that heading and in tabular form.

EAST KOOTENAY INSPECTION DISTRICT.

REPORT OF THOMAS MORGAN, INSPECTOR.

I have the honour, as Inspector of Coal Mines for the East Kootenay District, to submit my Annual Report for the year 1904. My period as Inspector for this District commenced on March 17th, 1904. The only company actually producing coal in this District, as yet, is the Crow's Nest Pass Coal Co., Ltd., but this company is operating three separate and distinct collieries.

Crow's Nest Pass Coal Co., Ltd.

Officers.	*Address.*
Hon. Geo. A. Cox, President,	Toronto, Ont.
Robert Jaffray, Vice-President,	"
G. G. S. Lindsey, Secretary and Managing Director,	"
E R. Wood, Treasurer,	"
R. G. Drinnan, General Superintendent,	Fernie, B. C.

Capital of the Company, $3,500,000.

The above Company is now operating the following extensive collieries on the western slope of the Rocky Mountains in the East Kootenay District, viz.:—

Coal Creek Collieries, situated on Coal creek, about 5 miles from the town of Fernie, on a branch railway to the mines.

Michel Collieries, situated on both sides of Michel creek, on the line of the C. P. Railway, being 23 miles in a north-easterly direction from Fernie.

Carbonado Collieries, situated on Morrissey creek and connected with the C. P. Railway and the Great Northern Railway at Morrissey. The colliery is about 14 miles from Fernie, by rail, in a south-easterly direction.

The total output of the Company's collieries for the past year was 662,685 tons. Of this 350,900 tons were used in the manufacture of coke, yielding 218,857 tons, of which 119,004 tons were sold for consumption in Canada, and 97,690 tons were exported to the United States.

The coal exported to the United States amounted to 118,188 tons, while 168,980 tons were sold for consumption in Canada.

The amount and disposition of this combined output is more fully shown in the following table:—

RETURNS FROM CROW'S NEST PASS COAL COMPANY'S COLLIERIES.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	168,980	....	....	....	119,004	....		
〃 export to United States	118,188	....	....	....	97,690	....		
〃 〃 to other countries	....	....	....	....	....	....		
Total Sales	....	....	287,168	....	....	....	216,694	—
Used in making Coke	350,900	....						
〃 under Colliery Boilers	24,617	....						
Total for Colliery Use	....	....	375,517	....				
Stocks on hand first of year	....	....	....	....				
〃 last of year	....	....	....	....				
Difference taken from Stock during year	....	....	....	....	....	....	2,163	
Output of Colliery for Year	....	....	662,685	—	....	....	218,857	—

NUMBER OF MEN EMPLOYED IN CROW'S NEST PASS COMPANY'S COLLIERIES.

CHARACTER OF LABOUR.	NUMBER EMPLOYED.		TOTAL NUMBER EMPLOYED.
	Underground.	Surface.	
Supervision and clerical assistance	42	14	56
Whites—Miners	621	....	621
Miners' helpers Labourers Mechanics and skilled labourers Boys	487	251	738
Japanese	....	....	....
Chinese	....	24	24
Indians	....	....	....
Total	1,150	289	1,439

COAL CREEK COLLIERY.

Andrew Colville, Manager.

This colliery is situated about 5 miles in an easterly direction from Fernie, where No. 1, No. 9 and No. 5 tunnels, on the north side of Coal Creek, and No. 2 and No. 3 on the south side, have been working.

No. 1 Mine.

David Martin, Overman.

This mine is worked by pillar and stall. My last inspection of this mine was made on the 5th and 6th of December. In the slope district I found a little gas in three places over the timber, and in the incline district I found gas in five places above the timber; also gas in cross-cut off No. 5 stall. All other places were clear.

The slope district received 32,000 cubic feet of air per minute for 55 men and 5 horses, while the incline district received 21,000 cubic feet per minute for 50 men and 5 horses. The main level district, which is abandoned, was supplied with 14,400 cubic feet of air per minute. The total air supplied to the mine was 96,000 cubic feet per minute, which gives a leakage of 28,600 cubic feet per minute for roads, doors, etc. A Guibal fan, 4½ by 14 feet, is the motive power of ventilation for this mine.

No 3 Mine.

John McClimont, Overman.

Pillar and stall work and extraction of pillars are being carried on in this mine. My last inspection was made December 8th, when I found all clear, and 25,200 cubic feet of air per minute for the use of 37 men and 3 horses. This mine and No. 2 have the same motive power for ventilation. The total air in the fan shaft was 165,000 cubic feet per minute, which gives a leakage of 49,940 cubic feet per minute.

No. 2 Mine.

John McClimont, Overman.

This mine is also worked by pillar and stall. My last inspection was made December 7th. Found a little gas in the cross-cut off No. 1 stall, all other places being clear. No. 1 district is not working, but received 14,000 cubic feet of air per minute. No. 2 district received 30,360 cubic feet of air per minute for 68 men and 6 horses, while 45,500 cubic feet per minute were supplied to district No. 3 for the use of 70 men and 6 horses. The motive power for ventilation is a Guibal fan, 8 by 16 feet.

No. 5 Mine.

John Hunt, Overman.

This mine is worked by pillar and stall. My last inspection was made December 8th, when I found a little gas in three inside stalls, all others being clear, with 34,450 cubic feet of air per minute for 30 men and 4 horses. The motive power of ventilation is a Guibal fan, 3 by 10 feet.

No. 9 Mine.

David Martin, Overman.

This mine is worked by long-wall, my last inspection being made December 5th. I found a little gas in two places, all the rest being clear, and 24,960 cubic feet of air per minute were supplied to 34 men and 4 horses. The motive power for ventilation is a Guibal fan, 3 by 10 feet.

The following are the official returns of the Coal Creek Colliery for the year ending 31st December, 1904:—

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	95,799	....	....	....	63,287			
" export to U. S.	47,217	....	....	....	54,527			
" " to other Countries	....	....	....	....	....			
Total Sales	....	....	143,016	....	....	....	117,814	
Used in making Coke	190,567	....						
" under Colliery Boilers, &c.	12,318	....						
Total for Colliery use	....	....	202,885					
Stock on hand first of year	....	....						
" last of year	....	....						
Difference added to stock during year	....	....	....	....	737			
Output of Colliery for year	....	....	345,901	....	....	....	118,551	

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and clerical assistance	21.50	....	5.50	....	27.00	
Whites—Miners	334.53	....	....	....	334.53	
Miners' helpers Labourers Mechanics & skilled labour Boys	254.47	....	131.96	....	386.43	
Japanese						
Chinese						
Indians						
Totals	610.50	....	137.46	....	747.96	

MICHEL COLLIERY.

Arthur R. Wilson, Manager.

This colliery is situated 24 miles in an easterly direction from Fernie, where No. 4, No. 6 and No. 8 mines are working at the present time. Upper No. 3, Lower No. 3 and No. 5 mines have been worked until recently, the fans being kept running slowly to keep the mines clear.

No. 4 Mine.

William Powell, Overman.

Pillar and stall work is being carried on in this mine. My last inspection of this mine was made on December 12th, when I found all clear of gas. No 5 South Level District was supplied with 41,000 cubic ft. of air per minute for the use of 17 men and 1 horse. No. 4 West

Level District is not working at present, but received 21,000 cubic feet of air per minute to keep it clear, and No. 2 level, which is not working, was supplied with 12,000 cubic feet of air per minute. Lower No. 3 mine and No. 4 mine are ventilated by No. 4 fan. The east side of No. 3 mine received 12,600 cubic feet of air per minute, and the west side 14,000 cubic feet per minute, while the total air in the return at the fan shaft was 134,400 cubic feet per minute, which shows a leakage of 33,800 cubic feet per minute.

No. 6 Mine.

Thomas Corkill, Overman.

This is a new mine, and as yet only a level and an air-way have been driven, and a slope started off the level. My last inspection was made December 12th, when I found 4,200 cubic feet of air per minute for the use of 16 men and 2 horses. This is natural ventilation, for a fan will be put up when connection is made with No. 7 tunnel, which is partly driven.

No. 8 Mine.

John Lee, Overman.

Pillar and stall work is being carried on in this mine. My last inspections were made December 12th and 13th, when I found all clear of gas. The main level district was supplied with 29,000 cubic feet of air per minute for the use of 50 men and 7 horses, while the main incline district received 18,440 cubic feet per minute for 30 men and 2 horses. The total air in the return at the fan shaft was 100,000 cubic feet per minute, which shows a leakage of 52,560 cubic feet per minute. A Guibal fan, 8 by 14 with 1-inch water gauge, is the motive power for ventilation.

The following are the official returns of the Michel Colliery for the year ending December 31st, 1904:—

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada	66,986	—	....		55,091	00		
〃 export to U. S	9,045	—	....		39,075	00		
〃 〃 to other Countries	....	....	....		....	....		
Total Sales	....	....	76,031	—	....	....	94,166	—
Used in making Coke	152,991	—						
〃 under Colliery Boilers, &c	6,234	—						
Total for Colliery Use	....	....	159,225	—				
Difference added to stock during year	....	....	....	....	1,519	00		
Output of Colliery for Year	....	....	235,256	—	....	....	95,685	—

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, &c.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and Clerical Assistance	13.50	....	4.50	....	18.00	
Whites—Miners........................	177.28	....	....	....	177.28	
Miners' Helpers.............. Labourers.................. Mechanics and Skilled Labour . Boys........................	181.32	....	74.23	....	255.55	
Japanese............................. Chinese............................. Indians..............................	....	....	24.00	....	24.00	
Totals.............	372.10	....	102.73	....	474.83	

CARBONADO COLLIERY.

Charles Simister, Manager.

This colliery is situated on Morrissey creek, about 13 miles from Fernie, and during the past year Nos, 0, 1, 3 and 4 mines have been working.

No. 0 Mine.

Elijah Heathcote, Overman.

This mine is worked by long-wall. My last inspection of this mine was made December 2nd, when I found it clear of gas and well ventilated, with 19,200 cubic feet of air passing per minute, for the use of 26 men and 1 mule. A Guibal fan, 3 by 10, is the motive power for ventilation.

No. 1 Mine.

This mine has not been worked since the disastrous outburst in November, which has been reported on.

No. 3 Mine.

David Wilson, Overman.

Pillar and stall work, and extraction of pillars, is being carried on in this mine. On my last inspection, December 2nd, I found it clear of gas and the ventilation good; 60,000 cubic feet of air were passing per minute for the use of 35 men and 2 mules. A Guibal fan, 8 by 16, with 1½-inch water gauge, is the motive power for ventilation.

No. 4 Mine.

Norman Fraser, Overman.

During the year considerable prospecting has being going on in this mine. On my last inspection I found a cap of gas in the main level; all the other places were clear and well ventilated, with 35,200 cubic feet of air per minute for the use of 13 men and 2 horses. A Guibal fan, 8 by 16 with 1½-inch water gauge, is the motive power for ventilation.

The following are the official returns of the Carbonado Colliery for the year ending 31st December, 1904:—

COAL AND COKE PRODUCED, EXPORTED, ETC.

SALES AND OUTPUT FOR YEAR.	COAL.				COKE.			
(Tons of 2,240 lbs.)	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.	Tons.	cwt.
Sold for consumption in Canada.......	6,195	....	....	....	626			
" export to United States......	61,926	....	....	....	4,088			
" " other Countries	....	....	....	....	....			
Total sales...............	....	....	68,121	....	....	....	4,714	
Used in making Coke	7,342	....	....					
" under Colliery boilers, etc.......	6,065	....	....					
Total for Colliery use	....	....	13,407					
Stock on hand first of year	....	....						
" last of year	....	....						
Difference taken from stock during year	....	....	....	....	93			
Output of Colliery for year.	....	....	81,528	....	....	....	4,621	

NUMBER OF HANDS EMPLOYED, DAILY WAGES PAID, ETC.

CHARACTER OF LABOUR.	UNDERGROUND.		ABOVE GROUND.		TOTALS.	
	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.	No. Employed.	Average Daily Wage.
Supervision and clerical assistance........	6.83	....	3.50	....	10.33	
Whites—Miners	109.61	....	....	....	109.61	
Miners' helpers Labourers Mechanics and skilled labour Boys	50.56	....	44.68	....	95.24	
Totals......................	167.00	....	48.18	....	215.18	

COKE.

A considerable amount of coal is used in the manufacture of coke of an excellent quality, which is in constant demand. At Michel there are 464 bee-hive ovens, at Fernie 412, and 240 at Carbonado.

PROSECUTIONS UNDER THE "COAL MINES REGULATION ACT."

July 20th—Alfred Severns, for having a match in No. 0 mine, Carbonado, was fined.

Oct. 20th—Joseph Roche, Frank Zeeman, H. Richardson, Joe Smith and And. Schaffar, were fined for tamping the holes with coal dust in Michel mine, contrary to Rule 9, Section 82, of the "Coal Mines Regulation Act."

ACCIDENTS.

I deeply regret to report that 19 fatal accidents and 14 serious and slight accidents have occurred in the coal mines of the East Kootenay District during my period as Inspector.

Of the fatal accidents, 14 were occasioned by an outburst of gas, which is described below. One death was caused by a fall of coal and rock, due to the breaking of a stringer. One fatality was caused by mine cars, being a pure accident. Another death resulted from the deceased slipping on a rail and striking his head on the same, an accident for which no one could be blamed. A piece of flying timber, caused by a shot, claimed another victim, whilst the remaining fatality happened on the pit-head by the deceased being caught with a belt.

Of the 11 serious accidents that occurred, 7 were caused by mine cars, 2 of which were due to the men's carelessness, the remaining 5 being pure accidents. One serious accident happened from a fall of coal and 2 from falls of rock, to men in their working places. The other accident of a serious nature occurred on the pit-head, where the slate-picker fell down the chute.

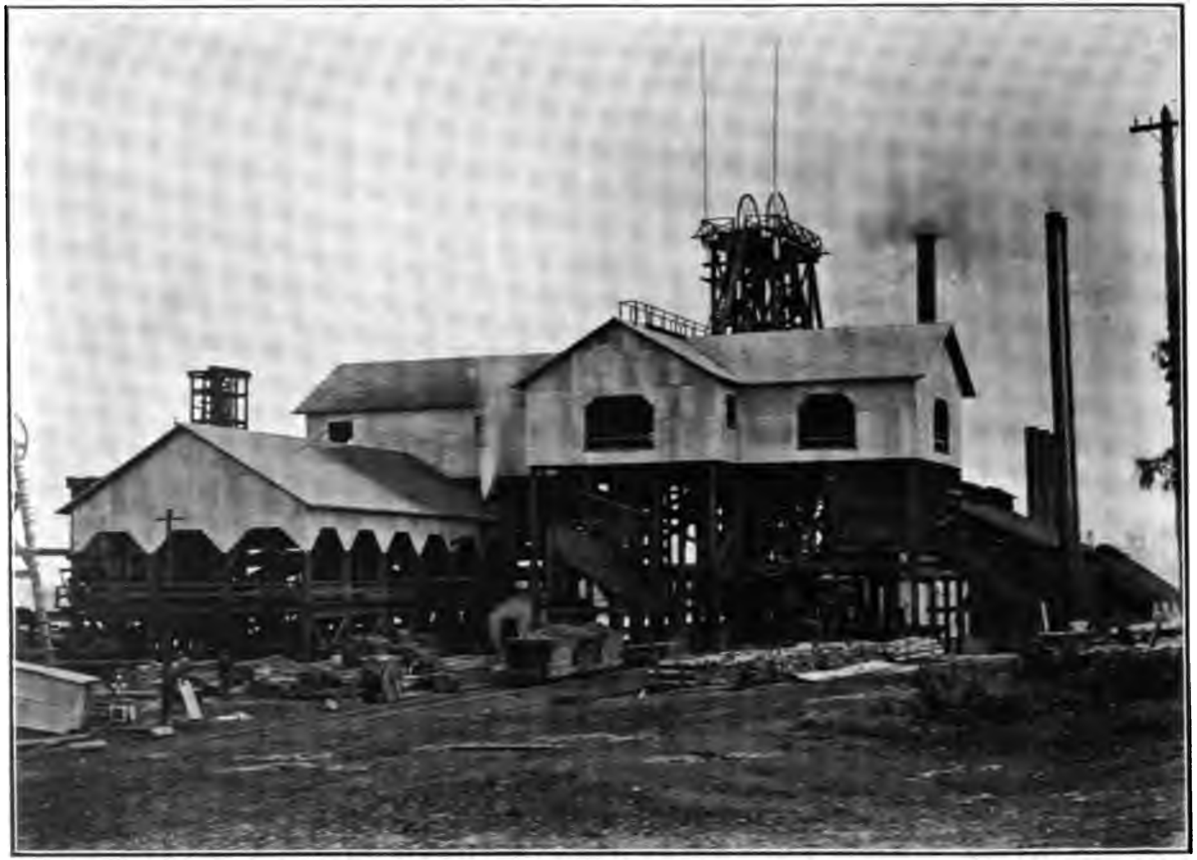
Three slight accidents were also reported, one being caused by a fall of coal, one by a rope, and one by a small explosion of gas.

I have made strict examination and inquiry into all such accidents, and inquests have been held whenever necessary, verdicts of such inquests being on file in the Attorney-General's Office.

You will find appended a detailed account of all such accidents.

ACCIDENTS IN BRITISH COLUMBIA COLLIERIES DURING 1904.

Causes of Accident and Nature of Injury.	Name of Colliery.												Total for 1904.			
	Nanaimo.			Union.			Extension.			Crow's Nest.						
	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Fatal.	Serious.	Slight.	Total.
Gas—Explosion or suffocation by	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	29
Fatal	...	...	...	...	...	...	...	...	...	21	...	...	21	...	...	...
Slight	...	...	...	...	...	5	...	...	2	...	...	1	...	...	8	...
Falls of Coal	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	18
Fatal	1	...	...	...	...	...	2	...	...	2	...	...	5	...	...	...
Serious	...	3	...	...	4	...	...	4	...	...	1	...	...	12	...	...
Slight	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...
Falls of Rock	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12
Fatal	...	...	...	3	...	...	1	...	...	...	...	...	4	...	...	...
Serious	...	1	...	...	4	...	...	...	...	...	2	...	...	7	...	...
Slight	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...
Mine Cars	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	23
Fatal	...	...	...	1	...	...	...	...	...	2	...	...	3	...	...	...
Serious	...	2	...	...	3	...	...	3	...	...	7	...	...	15	...	...
Slight	...	...	2	...	...	1	...	...	1	...	...	1	...	...	5	...
Shot	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Fatal	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...
Slight	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...
Locomotive	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Serious	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...
Post or Timber	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Serious	...	...	...	...	...	...	...	2	...	...	...	...	...	2	...	...
Ropes, Hoisting or Haulage	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
Serious	...	...	...	...	1	...	...	1	...	...	...	...	...	2	...	...
Slight	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Miscellaneous	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5
Fatal	...	...	...	1	...	...	...	...	...	2	...	...	3	...	...	...
Serious	...	1	...	...	...	...	...	...	...	...	1	...	...	2	...	...
Total	1	8	2	5	12	8	3	10	3	28	11	3	37	41	16	94



WESTERN FUEL CO.'S NEW PIT-HEAD, NANAIMO, B. C.

SUMMARY—TABLE SHEWING ACCIDENTS OCCURRING IN B. C. COLLIERIES IN TEN YEARS—1895 TO 1904.

For the year	1895.				1896.				1897.				1898.				1899.			
Output of coal—tons.	939,654				896,222				882,854				1,135,865				1,306,324			
No. persons employ'd	2,924				2,753				2,433				2,988				3,780			
Nature of Injury. Cause of Accident.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.
Explosion (cause unknown).	..	..	..	:	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Gas explosions	..	5	7	12	1	3	8	12	..	2	2	4	2	14	3	19	3	9	18	30
Falls of coal	1	4	..	5	3	4	1	8	1	3	2	6	3	4	..	7	1	4	3	8
〃 rock	5	13	..	18	2	8	.	10	2	7	2	11	1	5	3	9	3	5	4	12
Mine cars	2	9	..	11	1	8	..	9	3	4	..	7	1	9	3	13	3	9	4	16
〃 mules	..	..	..	..	..	2	..	2	..	1	..	1	..	2	..	2	..	..	..	..
〃 timber	..	..	..	..	..	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..
Hoisting, ropes, &c	..	3	..	3	..	1	..	1	..	2	..	2	..	..	..	..	..	..	..	..
Powder, &c., explo'n	..	..	..	..	..	1	..	1	..	..	..	..	..	3	1	4	..	2	1	3
Shot	2	3	..	5	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..
On surface — miscellaneous.	..	2	..	2	2	..	..	2	..	..	..	..	..	2	..	2	1	..	..	1
Fire in Mine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	10	39	7	56	9	29	9	47	6	21	6	33	7	39	10	56	11	29	30	70

For the year	1900.				1901.				1902.				1903.				1904.				Total for 10 years.			
Output of coal—tons.	1,590,179				1,691,557				1,641,626				1,481,913				1,685,698				13,251,892			
No. persons employ'd	4,178				3,974				4,011				4,264				4,453				35,758			
Nature of Injury. Cause of Accident.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.	Fatal.	Serious.	Slight.	Total.
Explosion (cause unknown).	..	..	..	..	64	..	..	64	125	..	..	125	..	..	..	..	14	..	..	14	203	...	...	203
Gas explosions	..	2	22	24	2	2	12	16	1	..	8	9	21	..	16	37	7	..	8	15	37	37	104	178
Falls of coal	2	14	3	19	6	9	2	17	1	4	1	6	4	5	2	11	5	12	1	18	27	67	15	105
〃 rock	6	15	3	24	6	8	4	18	7	6	2	15	8	8	4	20	4	7	1	12	44	82	23	149
Mine cars	4	7	3	14	3	5	5	13	3	6	5	14	5	7	2	14	3	15	5	23	28	79	27	134
〃 mules	..	..	..	..	...	..	..	...	...	..	..	...	..	..	..	..	..	..	..	..	...	5	...	5
〃 timber	..	1	1	2	...	2	..	2	2	..	..	2	1	2	..	3	..	2	..	2	3	9	1	11
Hoisting, ropes, &c	1	..	..	1	...	2	..	2	...	2	..	2	..	4	1	5	..	2	..	2	1	16	1	18
Powder, &c., explo'n	1	3	3	7	...	4	6	10	...	..	1	1	1	5	..	6	..	..	..	.	2	18	12	32
Shot	..	..	3	3	...	..	..	...	...	..	..	...	..	2	..	2	1	..	1	2	3	7	4	14
On surface — miscellaneous.	3	1	..	4	2	2	2	6	...	3	1	4	2	..	1	3	3	3	0	6	13	13	4	30
Fire in Mine	..	..	..	..	19	..	..	19	...	..	..	...	..	..	..	..	..	..	..	..	19	...	...	19
	17	43	38	98	102	34	31	167	139	21	18	178	42	33	26	101	37	41	16	94	380	329	191	900

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1904.

V. I. COLLIERIES, REPORTED BY ARCHIBALD DICK, INSPECTOR, AND F. H. SHEPHERD, ACTING INSPECTOR.

No.	Colliery.	Date.		Name.	Occupation.	Details.
1	Extension	Jan.	13	James Hill	Miner	Scalp wounds, dislocation of collar-bone, dislocation and fracture of knee. Caused by two sets of timbers being swung out by weight of rock above.
2	Union	〃	13	C Matthews	Fireboss	Slightly burned by ignition of small quantity of gas while cleaning a cave which blocked air-course at the botton of No. 3 Slope.
3	〃	〃	13	Lee (Chinaman)	Bratticeman	Slightly burned. Same cause as No. 2.
4	Extension	Feb.	3	Jos. Acquilanti	Miner	Killed by fall of top coal.
5	Nanaimo	〃	12	Sam Cottle	Mule driver	Injured about body by being caught between car and prop while driving a mule.
6	Union	〃	18	Geo. Wilson	Miner	Slightly burned by flame from a shot and using a short squib.
7	Extension	March	3	Wm. Hogan	〃	Two ribs broken by piece of coal falling from face.
8	Union	〃	7	Ah Chung	Runner	Leg broken by rope breaking while running box down in stall.
9	〃	〃	8	Wong Chong	Rope-rider	Killed by striking his head on roof while riding on top of full trip. Fractured neck.
10	〃	〃	12	Peter Inkster	Miner	Leg broken by fall of coal while mining in No. 4 Slope.
11	〃	〃	14	Wm. Marshall	Labourer	Nose broken by brake handle while lowering a trip of cars in No. 4 Mine.
12	Extension	〃	16	John Johnson	Conductor	Leg broken by being caught by switch rope in No. 2 Mine.
13	〃	April	4	John Barlow	Runner	Killed by fall of roof in his working place in No. 2 Level, No. 3 Mine.
14	Union	〃	9	Mah Hay	Track-layer's helper	Killed by fall of rock in No. 4 Mine.
15	〃	〃	9	Mah Jung	Miner	
16	Nanaimo	〃	11	Dan Morgan	Runner	Fractured pelvis. Jammed between car and roof while riding on a car of coal drawn by a mule in longwall workings, Protection.
17	Union	〃	11	Sing	Labourer	Hip dislocated by falling off buffer of car while applying brake.
18	〃	〃	26	Chung	Miner	Leg fractured while wedging down a piece of coal cap-rock in No. 5 Shaft.
19	Extension	May	3	James Vear	〃	Burned about face and hands with gas. Caused by going into his place after being told by fireman to await his arrival.
20	〃	〃	5	Robert Jones	〃	Arm broken while taking down top coal in No. 3 Mine.

Detailed Statement of Accidents in V. I. Collieries during 1904.—*Continued.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
21	Union	May 7	Thomas Brown	Miner	Crushed about body by fall of top coal in No. 3 Slope, No. 4 Mine.
22	〃	〃 10	Tong Hing	〃	Killed by fall of roof near bottom of No. 7 Shaft.
23	Extension	〃 23	Richd. Morgan	Driver boss	Broken arm and ruptured kidney. Caused by being crushed between a box and prop while breaking in a horse.
24	Union	June 3	Geo. Davis	Miner	Leg badly injured while lowering a box in in his stall. Leg got caught between rope and post. No. 4 Mine.
25	〃	〃 3	Yeddo (Jap.)	Labourer	Broken leg caused by fall of top coal in No. 4 Mine.
26	Extension	〃 9	Sam Choti	Loader	Collar-bone broken by pulling down some top coal.
27	Union	〃 13	Da Tsic	Miner	Hip dislocated by fall of roof in his working place, No. 5 Shaft.
28	Nanaimo	〃 16	F. Green, Jr.	〃	Broken thigh. Caused by fall of top coal, No. 1 Shaft.
29	〃	〃 28	Arthur Spencer	〃	Severely injured about head and shoulders by fall of rock in his working place, Newcastle Shaft.
30	Extension	July 11	John Livic	Runner	Squeezed about body. Caused by getting in front of loaded car, after being warned.
31	Union	〃 23	Sacko (Jap.)	Miner	Leg broken by fall of roof in his working place, No. 4 Mine.
32	Nanaimo	Aug. 1	Chas Drake	〃	Fractured knee. Caused by fall of top coal while working in pillars, No. 1 Shaft.
33	Union	〃 9	Jun Juk	Miner	Both slightly burned on hands and neck by ignition of small quantity of gas which had accumulated owing to derangement of ventilation by the firing of a shot.
34	〃	〃 9	Jun Chue	〃	
35	Extension	〃 10	Wm. Smith	〃	Broken leg. Caused while taking down top coal in No. 3 Mine.
36	〃	〃 12	Victor Celle	Motor-driver	Fractured skull, entailing loss of brain matter. Supposed to have got head jammed between cars and motor while coupling his motor to a trip. Now convalescent and mentally sound.
37	〃	〃 18	James Haddow	Miner	Killed by fall of top coal in No. 3 Mine.
38	〃	Sept. 13	John Wargo	〃	Leg broken and back injured by fall of top coal while timbering No. 3 Mine.
39	Union	〃 21	Carl Liapiatt	〃	Crushed about back by fall of coal while mining in No. 4 Mine.
40	〃	〃 23	F. Macintosh	Pumpman	Slightly burned on face by ignition of small quantity of gas in diagonal slope, No. 4 Mine.
41	〃	〃 24	Sam (Chinam'n)	Labourer	Hand and head slightly injured by falling in front of a trip of cars being lowered down incline, No. 6 Shaft.

DETAILED STATEMENT OF ACCIDENTS IN V. I. COLLIERIES DURING 1904.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
42	Extension.....	Sept. 27	John Lundy...	Driver...... ..	Slightly burned about hands and face. He crawled into a hole in the gob to head off a mule, and lit a little gas with above result. No. 3 Mine.
43	Nanaimo......	Oct. 12	Frank Green ..	Miner	Small bone of leg broken above ankle and head cut by fall of top coal while cutting out rock between top and bottom coal, No. 1 Shaft.
44	Union	〃 23	David Potter..	〃	Back bruised by fall of middle rock while working in his place.
45	Extension.....	Nov. 10	N. Badovinace	Runner......	Fractured leg. He was going down a shaft gradient in front of loaded car, contrary to orders. No. 3 Mine.
46	Nanaimo......	〃 14	J. W. McKenzie	Miner	Fatally injured by fall of top coal in No. 1 Shaft. Died in transit to bottom of shaft.
47	〃	〃 24	Fing Shu......	Surface labourer	Left leg broken while unloading mine timber in yard at No. 1 Mine.
48	〃	....	David Moffatt.	Miner	Bruised about shoulders while trying to jump on to trip of cars while in motion. No. 1 Shaft.
49	〃	Dec. 12	Yin Moy	Surface labourer	Compound fracture of leg. Caused by falling off locomotive in yard.
50	〃	〃 14	Geo. Hall.....	....	Bruised foot by getting it entangled in loop of rope while lowering car down slope, Protection Mine.
51	Union	....	Jas. Strang....	Overman......	Fatally injured. Leg severed by coal car in motion.
52	〃	〃 20	Lee (Chinaman)	....	Arm broken by fall of piece of middle rock, No. 6 Shaft.

NOTE.—On the afternoon shift of the 14th November, 1904, Joseph Carpentaro, a miner, aged 52 years, was found dead in his working place. I examined the place and failed to discover any evidence of mechanical injury, or that his death was due to any condition of his working place, or the mine generally. The Coroner, Dr. L. T. Davis, after examining the body, decided that death was due to heart disease, and that an inquest was not necessary.

This death has not been included in the above list of accidents, because, death ensuing from natural causes, this is not an accident, and, therefore, is not chargeable to the industry.

DETAILED STATEMENT OF ACCIDENTS IN B. C. COLLIERIES DURING 1904.

Reported by Archibald Dick and Thomas Morgan, Inspectors of Crow's Nest Collieries.

No.	Colliery.	Date.	Name.	Occupation.	Details.
1	Michel	Jan. 8th	D. Roberts....	Miners	These seven men were killed by an explosion of gas in the Michel Colliery, on the 8th January, 1904.
2	″	″ 8th	W. McAllister.		
3	″	″ 8th	Jack Sale.....		
4	″	″ 8th	Wm. King....		
5	″	″ 8th	B. Dean ..		
6	″	″ 8th	Tom Evans ...		
7	″	″ 8th	D. Thomas....		
8	Carbonado	Feb. 27th	Jos. Patterson.	″	Struck and killed by a runaway car on the incline in No. 3 Mine, Carbonado, on 27th February, 1904.
9	Coal Creek....	Mar. 22nd	H. McDonald .	Motorman's... helper	Foot crushed. In bumping cars together the first car climbed the motor with above result. No. 1 Mine.
10	Michel	″ 23rd	Wm. Anthony.	Timberman ...	Killed by fall of coal and rock. No. 8 Mine.
11	Carbonado	April 7th	— Patala	Driver	Hip dislocated by wheel of car, while stepping off front end of car. No. 0 Mine
12	Michel	″ 9th	Geo. Blake....	Engineer	Fatally injured. Caught by belt at pit-head, and thrown over pulley.
13	Coal Creek....	″ 12th	John Thomson.	Driver	Lost three fingers of right hand by getting jammed between car and timber. No. 5 Mine.
14	″	″ 14th	Job Lewellyn .	″	Two ribs broken and lung injured by being crushed by car.
15	″	May 4th	Isaac Simpkin.	Miner	Left ankle sprained by fall of top coal. No. 2 Mine.
16	″	″ 12th	Wm. E. Paton.	Driver	Killed. Turned horse loose, and got feet entangled in reins, falling in front of car which ran over him. No. 2 Mine.
17	″	June 13th	Geo. Campbell.	Miner	Leg broken. Riding on empty car and got caught between car and timber. No. 3 Mine.
18	Michel	July 14th	John Micone ..	Timberman ...	Fatally injured. Skull fractured by falling on rail. No. 8 Mine.
19	Coal Creek....	″ 18th	Ed. Gallagher..	Miner	Leg broken by fall of coal. No. 2 Mine.
20	″	″ 20th	John Langdon.	Boy	Leg broken between two cars while jumping on motor trip. No. 5 Mine.
21	″	″ 23rd	Ralph Smith..	Miner	Several ribs broken by fall of coal in No. 2 Mine.
22	Michel	″ 27th	Robert Lee....	Shot-lighter ..	Fatally injured by blow from flying post, blown out by shot. No. 8 Mine.
23	Coal Creek....	Aug. 3rd	Wm. Sutton ..	Rope-rider	Right foot broken. Crushed while lifting car on to track. No. 2 Mine.
24	″	″ 10th	D. Warlow ...	Miner	Three fingers badly lacerated. Lowering car, when hand was drawn into wheel. No. 5 Mine.

Detailed Statement of Accidents in Crow's Nest Collieries during 1904.—*Concluded.*

No.	Colliery.	Date.	Name.	Occupation.	Details.
25	Michel	Sept. 22nd	Louis Vince	Miner	Slightly burned by ignition of small quantity of gas. No. 8 Mine.
26	Carbonado	〃 24th	Robt. Hewitt	Slate-picker	Arm taken off. Fell down chute, getting caught between chute and picking table.
27	Coal Creek	Oct. 1st	Alex. Page	Miner	Right leg broken by fall of rock. No. 2 Mine.
28	Carbonado	Nov. 18th	Wm. Jenkins	Bratticeman	These fourteen men were killed by a terrific outburst of gas, which filled the level with coal for 400 feet. Foreman reported everything clear and quiet at face 20 minutes before the outburst. The level had not been working for two weeks, and outburst must have come from the counter level above, or from the incline, which is also full of coal.
29	〃	〃 18th	Louis Craker	Miner	
30	〃	〃 18th	Mike Gustick	Mule-driver	
31	〃	〃 18th	Pat Boyle	〃	
32	〃	〃 18th	Wm. Platt	〃	
33	〃	〃 18th	A. Pechmick	Miner	
34	〃	〃 18th	V. Wenzl	Miner's help.	
35	〃	〃 18th	M. Kuzlatski	〃	
36	〃	〃 18th	Peter Tenney	Miner	
37	〃	〃 18th	A. Brindach	〃	
38	〃	〃 18th	A. Johnson	Miner's help.	
39	〃	〃 18th	Jos. Luchie	〃	
40	〃	〃 18th	Jas. Greenman.	Miner	
41	〃	〃 18th	John Brindach.	Miner's help.	
42	Coal Creek	Dec. 22nd	Steph'n Hunter	Miner	Killed by fall of coal and rock.

LIST OF CROWN-GRANTED MINERAL CLAIMS.

CROWN GRANTS ISSUED IN 1904.

Cassiar.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Yellow Jacket	Atlin	North Columbia G. M. Co	191	51.65	July 9

East Kootenay.

B. C.	Windermere.	H. E. Forster and Celina M Kimpton	1732	51.65	Sept. 27
Black Watch	Fort Steele	Henry B. Thomson	3329	30.72	Mar. 29
Blackwater	〃	〃	3330	34.10	〃 29
Bodie	〃	Robt. W. Riddell *et al.*	3458	51.65	May 14
Celt	〃	David Griffith	6205	46.30	Mar. 25
Charlotte	Golden	Wm. G. Carlin	405	51.65	Oct. 31
Erin	Fort Steele	Henry B. Thomson	3332	37.20	Mar. 29
Gold Bug Fr. No. 2	〃	Eugene B. Braden	6191	2.76	Feb. 15
Hot Punch	Windermere.	Willis B. Abel *et al.*	5100	51.65	Sept. 30
Isaac	〃	Harold E. Forster	5344	31.43	〃 27
Lentz Lode	Fort Steele	David Griffith	6203	39.25	Mar. 7
Malachite	〃	Henry B. Thomson	3331	22.10	〃 29
Minnie	Golden	Wm. G. Carlin	419	51.65	Oct. 31
Ruth	〃	〃	418	49.75	〃 31
Sweepstake	Fort Steele	Luke Creek Gold Copper Mg. Co., Ld. (N.P.L.)	6577	51.65	Dec. 16
Tilbury	Windermere.	Harold E. Forster and Celina M. Kimpton	1733	40.81	Sept. 27
Tit for Tat	Fort Steele	David Griffith	6202	44.80	Mar. 25

West Kootenay.

Agnes	Trout Lake	Henry H. Johnstone *et al.*	5696	51.65	Nov. 11
Aice	Lardeau	Wm. Howard Jackson	4237	46.03	Jan. 14
Alhambra	Slocan	Frank L. Christie *et al.*	1607	35.12	Sept. 30
Alice	Nelson	Geo. W. Chisholm	5627	50.98	Mar. 9
Alma	Ainsworth	King Solomon Mg. Co	6284	49.86	Nov. 7
Alma No. 2	Lardeau	Wm. Howard Jackson	3501	20.69	Jan. 14
Alva	Ainsworth	King Solomon Mg. Co	6283	51.65	Nov. 7
Antonio	Nelson	Gordon M. & M. Co., Ltd.	3276	49.14	June 29
Archer	〃	Arthur V. Powys	3202	32.60	Mar. 28
Archie Fractional	Slocan	Wm. J. McMillan and Robt. J. McMillan	3631A	48.34	June 20
Astral	Nelson	Venus G. M. Co., Ltd	4296	35.07	〃 21
August Fract.	Ainsworth	King Solomon Mg. Co	6287	.09	Nov. 7
Bayonne	Nelson	Frank C. Risdon and George Harrison	5083	45.53	〃 19
Belle Smith	Slocan	Alice Trenery *et al*	3824	34.59	July 22
Big Duluth	Nelson	Geo. W. Chisholm	5626	49.42	Mar. 9
Black Beauty	Slocan City	Eric Lemieux *et al.*	2823	47.21	Dec. 8
Black Eagle	Trout Lake	John Grant	4735	45.35	April 28
Black Eagle	Ainsworth	King Solomon Mg. Co	6266	41.66	June 22
Black Eagle Fr	〃	〃 〃	6270	28.70	〃 22
Blue Bell	Trout Lake	John Stauber *et al.*	5707	39.70	Sept. 8
Blue Jay	Lardeau	Imperial Dev. Synd., Ltd	5184	21.43	Feb. 22
B. N. A.	Ainsworth	The B. N. A. Mines Co., Ltd.	5994	51.62	May 30
B. N. I.	〃	King Solomon Mg. Co	6264	51.65	June 22
Bobbie Burt	〃	F. A. Devereux	6335	51.65	Sept. 23
Bonner	Nelson	David G. Porter and Jacob C. Porter	6296	37.38	〃 27

WEST KOOTENAY.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Boston	Lardeau	Met. G. & S. M. Co., of Lardeau, B. C., Ltd.	5326	44.07	Nov. 2
Boulder	Slocan City	Chas. Faas and W. H. Crawford	2819	22.73	May 16
Buckeye	Ainsworth	Wm. C. Dalglish and C. M. Parker	6327	36.50	Dec. 20
Buckeye No. 2	〃	〃 〃	6328	28.60	〃 20
Cambridge	Nelson	Venus G. M. Co., Ltd	4299	29.67	June 21
Canon Fract.	Lardeau	Imperial Dev. Synd., Ltd.	5403	1.61	Mar. 14
Chamois	Ainsworth	Wm. J. H. Holmes	4892	51.65	Dec. 7
Chicago	Lardeau	Metropolitan G. & S. M. Co., of Lardeau	5327	37.71	Nov. 2
Chicago Fract.	〃	〃 〃 〃	5332	6.56	〃 2
Chihuahua	Nelson	G. W. McBride	5199	47.47	May 9
Cholla	Lardeau	Imperial Dev. Synd., Ltd	5399	18.00	Feb. 22
City	Nelson	Wm. J. Goepel	5291	38.34	Nov. 22
Clara	Lardeau	Imperial Dev. Synd., Ltd	5185	41.75	Feb. 22
Clara Moor	Slocan	A. R. Fingland	5762	33.75	Sept. 9
Columbus	Nelson	Frank C. Risdon and Geo. Harrison	5961	39.45	Nov. 19
Comstock	Ainsworth	Geo. F. Cleveland *et al*	1027	41.32	Jan. 14
Corean	〃	Watt R. Winstead	6288	31.74	Nov. 1
Corinthian	〃	Luzetta Field *et al.*, for R. D. Munro	2090	45.08	Mar. 8
Cosmopolitan	Nelson	Venus G. M. Co., Ltd	4295	50.55	June 21
C. P. R.	Slocan	Catherine Sterrett	4875	46.19	July 22
Creole	Slocan City	Ch. S. Baxter (?) and Wm. D. McIntosh (?)	5733	35.95	Nov. 16
Cristein	Slocan	A. A. McDonald and Chauncey B. Taylor	5369	44.70	July 11
Crossfell	〃	Robt. Ewin	5879	26.42	Sept. 30
Croydon Fract.	〃	Silver Band Mg. Co., Ltd	5886	.91	April 13
Crusader	Slocan City	Chas. Faas and W. H. Crawford	5985A	51.65	May 16
Delaware	Nelson	Frank C. Risdon and Geo. Harrison	5960	36.06	Nov. 19
Diamond Fract.	Slocan	Robt. McTaggart *et al*	5832	15.20	Oct. 31
Dora	Lardeau	Imperial Dev. Synd., Ltd	5182	41.96	Feb. 20
Dip	Trail Creek	Geo. N. Taylor	1074	12.00	June 23
Elated	Ainsworth	Francis A. Devereux	3366	42.40	Sept. 23
Elk	Nelson	Alex. McDonald	2081	51.65	〃 23
Elkhorn Queen	Ainsworth	Archibald York *et al*	5969	41.54	April 12
Ella Fraction	Trail Creek	Ella C. McDonald *et al*	4920	8.81	Nov. 22
Emerald No. 2	Nelson	Reginald M. Macdonald	1486	51.65	Mar. 19
Enterprise	Ainsworth	King Solomon Mining Co	6001	51.65	June 22
Ethel K	Slocan City	Noah F. McNaught	4026	51.65	Feb. 3
Eva Fraction	Trail Creek	Jens Olsen	4205	10.70	Mar. 7
Eva Fraction	Ainsworth	King Solomon Mining Co	6285	2.09	Nov. 7
Excelsior	Nelson	Frank Bowser	2085	51.65	Feb. 25
Fairview	Lardeau	Metropolitan G. & S. M. Co., of Lardeau	5330	51.65	Nov. 2
Fairview	Ainsworth	Alex. Smith and Jas. Armstrong	5998	39.10	July 12
Faringdon	Slocan	Silver Band M. Co., Ltd	5884	51.65	April 13
Fidelity	Ainsworth	Attilio C. Buzzetti	6289	48.90	Dec. 7
Fidelity No. 2	〃	〃	6290	42.42	〃 7
Florence	Slocan	Thos. W. Fitzgerald *et al*	5764	46.33	April 18
Fourth of July	Nelson	Broken Hill M. & Dev. Co., Ltd	2917	7.77	Sept. 23
Freddy	Slocan	John A. Turner and Hugh Nixon	4025	34.40	Jan. 25
Garabaldi	Slocan City	Jos. Traficanti *et al.*	5748	30.23	Nov. 15
Garfield	Nelson	R. W. Caldwell and C. L. Caldwell	4939	50.35	Jan. 14
Gipsy	〃	Arthur V. Powys	3200	30.32	Mar. 28
Glasier	Ainsworth	Dan. H. Nellis	6263	51.65	June 22
Gold Hill	Nelson	John Holm *et al.*	4792	45.57	May 7
Goldseeker Fract	Trout Lake	Alfred O. Kirby	1104	.23	June 20
G. West Fract.	Nelson	Aaron H. Kelly	4779	17.84	Jan. 7
Hampton	Slocan City	N. F. McNaught	4027	25.94	Feb. 3
Hattie B.	Nelson	G. W. Chisholm	5628	50.82	Mar. 9
Hector	Ainsworth	Johanna E. Brockhausen and Don. C. Joslyn	5074	18.27	Sept. 22
Hidden Treasure	Slocan City	Chas. Faas and Wm. H. Crawford	2818	43.10	May 16
Homestake	Nelson	David G. Porter and Jacob C. Porter	6297	51.34	Sept. 27
Horseshoe	Ainsworth	Peter McLaren and Wm. A. Allan	3634	38.90	〃 22

West Kootenay.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Horse Shoe	Ainsworth	Geo. W. Chisholm	5066	49.80	March 22
Horse Shoe Fract	〃	〃	5067	20.60	〃 22
Humming Bird	〃	B. N. A. Mines, Ltd	5995	28.20	May 30
Hunter	Lardeau	Geo. K. Morton, Hy. N. Boss, admin. estate Jno. C. Wagner, deceased	4495	36.94	Jan. 25
Illinoise	Nelson	Frank C. Risdon and George Harrison	6888	49.39	Nov. 19
International Fract	Slocan	Lee W. Parkinson *et al*	2834	38.43	Feb. 3
Iron Hand	Ainsworth	Anna K. Paulson	5668	51.65	April 12
Iron Paint	〃	King Solomon Mg. Co	6267	45.80	June 22
Islington	Slocan	Silver Band Mg. Co	5883	23.39	April 13
Joker	Lardeau	Imperial Dev. Syndicate, Ltd	5404	23.62	Feb. 22
Kentucky	Nelson	Frank C. Risdon and George Harrison	5966	35.81	Nov. 19
Kit Sup	Lardeau	Walter R. Myers	3500	50.60	Feb. 15
Legal	Slocan City	Wm. Jas. Johnson	5977	35.94	July 6
Libbie R.	〃	Frank L. Christie *et al*	1604	28.22	Sept. 30
Little Joe	Nelson	Jas. R. Hunnex	6059	51.65	May 7
Little Phil	Trout Lake	Elbert M. Morgan	4733	41.75	Jan. 26
Louise Fract	Slocan City	A. S. Johnson *et al.*	5980	43.03	July 7
Lucky Bill	Ainsworth	King Solomon Mg. Co	6276	51.65	June 22
Lucky Bill Fract	〃	〃	6275	47.28	〃 22
Lucky Edd	〃	Alex. Smith and Jas. Armstrong	5999	36.00	July 12
L. V. Fract	Lardeau	Imperial Dev. Syndicate, Ltd	5401	23.07	Feb. 22
Lynx Fract	Ainsworth	B. N. A. Mines, Ltd	5996	7.60	May 30
Madison Extension	Slocan	Jas. A. O. Carmichael	5192	48.86	June 30
Maggie	Ainsworth	John Kelly	2718	51.65	Dec. 7
Maryland	Nelson	Frank C. Risdon and George Harrison	5085	23.90	Nov. 19
Metropolitan Fract	Lardeau	Metropolitan G. & S. M. Co., of Lardeau	5331	5.44	〃 2
Monarch	Nelson	Michael C. Monaghan	2082	27.39	Sept. 26
Monday	〃	Gordon M. & M. Co., Ltd	3277	36.65	June 29
Montreal	Lardeau	Metropolitan G. & S. M. Co., of Lardeau	5328	31.00	Nov. 2
Mother Lode	〃	Wm. Howard Jackson	1497	14.35	Jan. 14
Native Silver	Ainsworth	King Solomon Mg. Co	6265	51.64	June 22
Native Silver Fract	〃	〃	6273	42.60	〃 22
Neenah	Goat River	Mary C. Barnes	1373	51.65	〃 1
Nelson	Nelson	John Paterson	5290	51.65	Nov. 22
Nelson Star	〃	Arthur V. Powys	3199	31.10	Mar. 28
New Jersey	〃	Frank C. Risdon and George Harrison	5967	29.90	Nov. 19
New Victor	〃	Frank Bowser	2083	39.24	Feb. 25
New York	Lardeau	Metropolitan G. & S. M. Co., of Lardeau	5325	36.07	Nov. 2
Noah	Ainsworth	King Solomon Mg. Co	6286	47.23	〃 7
North America	〃	Dan. H. Nellis	6269	51.65	June 22
Oakland	Slocan	Ferdinand F. Liebscher	4876	50.67	Aug. 6
Ohio	Nelson	Frank C. Risdon and George Harrison	5962	33.27	Nov. 19
Olds	Ainsworth	King Solomon Mg. Co	6277	25.00	June 22
Onoda	〃	B. N. A. Mines, Ltd	5997	35.30	May 30
Orient Fract	Slocan	Robt. McTaggart *et al*	5831	27.20	Oct. 31
Oxford	Nelson	Frank C. Risdon and George Harrison	5084	50.70	Nov. 19
Perle	Slocan City	Donald A. Ross	2422A	51.65	Feb. 15
Philadelphia No. 2	Slocan	Wm. A. Coplen *et al*	5072	51.65	May 17
Phoenix No. 3	〃	Frank L. Christie *et al*	1603	41.77	Sept. 30
Ping-Pong Fract	Slocan City	Noah F. McNaught	4028	37.41	Feb. 3
Polo	Slocan	Howard Williams	2260	25.00	〃 3
Porcupine	Ainsworth	King Solomon Mg. Co	6282	40.45	Nov. 7
Rapid	Nelson	Edward C. Arthur	5302	22.00	Jan. 25
Redress Frac. No. 2	Slocan	Geo. F. Ransom *et al*	3209	14.75	Oct. 31
Republic Fract	Nelson	Arthur V. Powys	3208	25.20	Mar. 28
Republic	〃	〃	3206	8.74	〃 28
Rita	Slocan City	A. S. Johnson and Wm. S. Johnson	5978	42.07	July 7

WEST KOOTENAY.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
R. & L.	Ainsworth	L. Field and C. G. Major, for R. D. Munro.	2089	45.66	March 8
Rodney	Slocan	Silver Band M. Co	5887	46.60	April 13
Rustler	Nelson	Gordon M. & M. Co., Ltd	3275	51.28	June 29
Rose	Slocan City	A. S. Johnson *et al*	5979	45.76	July 7
Royal	Nelson	Frank Bowser	2084	32.26	Feb. 25
Royal Charter	〃	Alfred Bunker and Montague S. Davys	3205	51.20	Sept. 26
Royal Seal	〃	〃	3204	51.65	〃 26
Rome	Slocan City	Jos. Traficanti	5747	50.82	Nov. 15
San Francisco	Lardeau	Metropolitan G. & S. M. Co., of Lardeau	5329	51.11	Nov. 2
Silver Band	Slocan	Silver Band Mg. Co	5878	51.65	April 13
Silver Belt	Trout Lake	Henry H. Johnstone *et al*	5695	51.65	Nov. 11
Silver Glance	Ainsworth	Eric Erickson *et al*	3829	44.72	Feb. 15
Silver Leaf No. 2	Slocan City	George Long *et al*	5763	51.47	Sept. 23
Shamrock	Nelson	Gordon M. & M. Co	3274	51.65	June 29
Smuggler	Slocan City	Josiah J. Godfrey	3823	38.10	July 9
Snow Flake	Ainsworth	Geo. W. Chisholm	5065	35.80	Mar. 22
Stanley	Slocan	Irvin A. Austin	2102	51.65	Aug. 5
Summit Queen	Ainsworth	Eric Erickson *et al*	3830	47.40	Feb. 15
Sunrise	〃	James A. Poyntz	5991	47.60	April 12
Sunset	Trout Lake	John Grant	4736	51.21	〃 28
Surprise No. 2	Ainsworth	Francis A. Devereux	6334	51.65	Sept. 23
Thelma Fractl.	Lardeau	Imperial Dev. Syndicate, Ltd	5186	4.62	Feb. 20
Thelma	〃	〃 〃	5183	41.50	〃 20
Toronto	Ainsworth	Alex. Smith and James Armstrong	6000	25.83	July 12
Toronto Fract	Nelson	Percy E. Doolittle	4301	25.73	Sept. 26
Trapper	Lardeau	G. K. Morton and Hy. N. Boss, adm. estate of J. C. Wagner, deceased	4494	51.65	Jan. 25
Treadwell	〃	Imperial Dev. Syndicate, Ltd	5402	14.12	Mar. 14
Trixie V	Nelson	J. B. McLaren and Edmund D. Sewell	3848	42.43	Jan. 25
Tuscon	Lardeau	Imperial Dev. Syndicate, Ltd	5400	30.21	Feb. 20
Twickenham	Slocan	E. F. Smith and F. E. Clute	5885	51.65	April 13
Twyford	〃	Silver Band Mg. Co., Ltd	5881	21.40	〃 13
Utopia Fractl.	Nelson	David G. Porter and Jacob C. Porter	6298	11.95	Sept. 27
Virginia	〃	Frank C. Risdon and George Harrison	6887	36.31	Nov. 19
Warwick	〃	Broken Hill M. & D. Co., Ltd	4676	43.41	Sept. 23
Weymouth	Slocan City	Chas. E. Smitheringale and John L. Farwig.	1842	48.00	Aug. 5
Winton	Slocan	Silver Band Mg. Co., Ltd	5882	48.65	April 13
White Beauty	Slocan City	Eric Lemieux *et al*	2822	51.65	Dec. 8
White Warrior	Ainsworth	Geo. W. Chisholm	5064	51.57	Mar. 22

YALE.

Ada B. Fr	Similkameen	Chas. Willarson *et al*	839	.33	Nov. 12
Ada B	〃	〃 〃	835	35.58	Nov. 12
Alameda	Greenwood	Everett E. Bartlett and Helen H. Bartlett.	2876	37.47	July 13
Alberta	Similkameen	Duncan McCallum and Wm. Towe	1253	51.65	Dec. 7
Alpha	Grand Forks	John Cranstoun	3174	43.38	Oct. 24
Anglo-Saxon	Greenwood	Mary A. Desrosiers	2573	25.60	Oct. 31
Annie L.	Similkameen	Alex. W. Smith and Pat. H. Kennedy	787	48.00	June 20
Arlington	〃	Richard Seeman	1656	42.80	April 18
Banner	Kamloops	Thos. Hunter	972	50.75	Mar. 29
Bay Horse	Grand Forks	Isaac H. Hallett and Herbert R. Davidson	1566	35.20	Sept. 27
Bengall	Greenwood	Henry T. Machin	2375	51.49	Aug. 5
Black Diamond	〃	Robt. Wood *et al.*	2275	37.50	Mar. 25
Blue Bell	Similkameen	Alex. D. Ross	132	29.88	June 20
Bobbs	Osoyoos	Eclipse M. & M. Co	2966	26.61	Sept. 19
Boulder Cap	Kamloops	Thos. Hunter	974	36.04	Mar. 29
Bristol	Greenwood	Hy. T. Machin	2376	40.41	Aug. 5

YALE.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Bruce	Greenwood	Jacob C. Haas and Sydney M. Johnson	913	51.65	Feb. 20
Buller	Osoyoos	Eclipse M. & M. Co	2965	36.08	Sept. 19
Burns Fract	Greenwood	Francis J. Finucane	1281	21.40	Feb. 3
Butcher Boy	〃	Robt. D. Kerr and Philip B. S. Stanhope	2353	51.63	Oct. 24
Butte	〃	Chas. D. Temple	2956	25.04	Sept. 27
Caledonia	〃	A. Waddell, Eug. Sullivan, Mary McMynn.	2836	51.60	Oct. 29
Canadian Belle	Similkameen	Richd. Seeman	1655	38.62	April 18
Canadian Boy Fr.	〃	〃	1657	2.72	〃 18
Centre Star Fract.	〃	Chas. Willarson *et al*	840	6.66	Nov. 12
City of Armstrong.	Grand Forks	Vanc. & Bdy. Ck. Dev. & Mg. Co., Ltd.	3001	37.40	Mar. 8
City of Vancouv'r Fr	〃	André Gire and H. S. Cayley	2013	23.25	April 22
Colorado	〃	Robt. Clark	3005	51.65	Sept. 14
Commander Fract.	Greenwood	Isaac H. Hallett	1708	6.38	Dec. 12
Copperania	Similkameen	Smith Curtis *et al*	134	30.20	Aug. 8
Crown	Osoyoos	Eclipse M. & M. Co	2969	51.65	Sept. 19
D. C.	Similkameen	Sydney R. Almond *et al*	1184	51.65	Mar. 28
Deer Bell	Greenwood	Mary A. Desrosiers	2572	49.92	Oct. 31
Diamond	Grand Forks	J. F. Cunningham and John Mulligan	1327	51.65	Nov. 2
Diamond Joe	Greenwood	Jane Russell *et al*	1523	43.70	July 13
Doubtful	〃	〃 〃	1524	39.25	〃 13
Duncan	〃	Robt. Wood *et al.*	2605	51.65	Sept. 13
Eclipse Fract.	Osoyoos	Eclipse M. & M. Co., Ltd.	2976	13.16	〃 19
Ellen	〃	〃 〃	2974	49.49	〃 19
Ennismore	Grand Forks	Esdras N. Quinette	2595	41.03	Oct. 26
Eugenie	〃	Vanc. & Boundary Ck. Dev. & Mg. Co., Ltd.	2612	44.30	July 13
Foghorn	Greenwood	Jacob C. Haas and Sydney M. Johnson	1457	38.55	Feb. 20
French	Osoyoos	Eclipse M. & M. Co	2975	45.77	Sept. 19
Gertrude	Grand Forks	Wm. B. Bower	1621	39.04	Oct. 28
Globe	Greenwood	Jas. Anderson	2402	37.30	Aug. 5
Golden Gate	Osoyoos	Dominion, Fairview & Golden K. Synd., Ltd	2064	30.82	Mar. 4
Great Republic	Similkameen	John P. McLeod and Chas. H. Bouter	2050	42.47	Sept. 8
Hard to Beat	Greenwood	Mary T. McMynn and Wm. G. McMynn	2846	29.95	〃 11
Helena	〃	Chas. D. Temple	2955	20.20	〃 27
Highland Mary	〃	Sydney M. Johnson	1462	51.65	〃 9
Homestake No. 2.	Similkameen	Sydney M. Johnson & Herbert R. Davidson	237	44.74	Aug. 8
Huckleberry	〃	Alex. D. Ross	129	51.65	June 21
Idaho	Greenwood	Wm. G. McMynn and Alex. Waddell	2642	49.58	Nov. 18
Ingersoll Belle	Similkameen	Hannibal L. Jones *et al*	234	37.85	Aug. 8
International	Grand Forks	Fred. Kettner	2873	51.65	Aug. 5
Iowa	Osoyoos	Eclipse M. & M. Co	2973	32.89	Sept. 19
I. X. L.	〃	〃 〃	2972	39.57	〃 19
Jack Pot Fract.	Grand Forks	Wm. T. Hunter	3158	24.20	Jan. 25
Jewel	Greenwood	Wellington Elson	2785	35.29	July 6
June Bug	Similkameen	Francis W. Groves *et al.*	3029	41.74	Aug. 8
Jubilee	Greenwood	Jacob C. Haas and Sydney M. Johnson	919	36.37	April 12
Kaffir King	Greenwood	Mary T. McMynn *et al*	2646	44.07	Sept. 9
Keestowe	〃	Randolph Stuart *et al*	1240	30.45	Dec. 6
Kenley	Similkameen	Ernest Waterman and Edwin B. Hall	3028	51.65	Oct. 28
King of the Hills	Greenwood	John N. Greden	2582	44.00	Aug. 5
King Solomon	〃	Sydney M. Johnson *et al*	3126	42.33	Sept. 14
Kinlaugh	Kamloops	Thos. D. Guest	838	16.92	Dec. 31
Kitchener	Osoyoos	Eclipse M. & M. Co	2967	51.65	Sept. 19
Knight Rambler	Greenwood	Wm. A. McKay and John H. McKenzie	3015	45.50	Nov. 15
Kruger	Osoyoos	Eclipse M. & M. Co	2971	51.65	Sept. 19
Lakeside	Grand Forks	I. H. Hallett and I. H. Hallett as administrator estate of A. M. Connor	2871	4.21	Nov. 1

YALE.—*Continued.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Lake View........	Grand Forks	I. H. Hallett and I. H. Hallett as administrator of Archd. M. Connor............	2869	26.90	Oct. 25
Lancaster Fract...	Greenwood..	Geo. A. Rendell	2868	46.20	April 20
Little Annie	〃 ..	Jas. McNulty *et al*.....................	2389	27.56	July 5
Little Brown.....	〃 ..	〃 〃	2390	49.54	〃 5
Little Pete........	〃 ..	Mary A. Desrosiers	2574	19.51	Oct. 31
Lone Star.........	Grand Forks	Thos. Kirk and Wm. J. Harris	2878	51.65	Sept. 28
Lottie F..........	Greenwood..	Wm. Farney *et al*.......................	2949	51.65	Dec. 5
Mable Fract......	Similkameen	Edgar E. Burr *et al*....................	3024	33.77	June 20
Magnetic	〃	H. L. Jones and A. B. Clabon............	235	23.92	Aug. 8
Magnetite.........	Greenwood ..	Geo. R. Naden and Sydney M. Johnson....	920	48.25	April 12
Magnolia..........	〃 ..	William Farney *et al*....................	2950	51.65	Dec. 5
Marquis of Lorne..	Similkameen	Ernest V. Bodwell	2752	40.51	Sept. 28
Marshall..........	Greenwood..	Jas. McNulty *et al*......................	2388	49.54	July 5
Marshall Fract....	〃 ..	〃 〃	2404	4.96	〃 5
Matabelle Fract...	Grand Forks	Dougald McInnis	2114	4.77	Jan. 26
May	Greenwood..	Robt. D. Kerr *et al*......................	2355	49.30	Oct. 24
Maze..............	〃 .	G. M. Bennett *et al*.....................	1818	50.57	Feb. 27
Milo Fract........	Similkameen	Edgar E. Burr *et al*.....................	3025	25.85	June 20
Mogul.............	〃	Chas. Willarson and Peter Johnson........	255	24.50	Nov. 12
Mogul Fract.......	〃	〃 〃	256	2.53	〃 12
Mona..............	Greenwood.	Mary T. McMynn *et al*...................	2841	43.25	Sept. 9
Monte Reco......	〃 ..	Jas. N. Paton *et al*......................	1242	35.	May 10
Morning Star	Similkameen	Alex. D. Ross	131	39.27	June 21
Mountain View Fr.	Grank Forks	Donald D. Mann	1710	2.89	Feb. 24
Nellie	Greenwood..	John N. Greden *et al*....................	2580	48.14	Nov. 15
Nellie Cotten......	〃 ..	Mark Sands	1460	51.65	Jan. 13
New Jack of Spades	Grand Forks	Vanc. & Bdy. Ck. M. & Dev. Co., Ltd., *et al*	2804	50.23	Sept. 19
No. 3..............	Greenwood..	R. D. Kerr and P. B. S. Stanhope.........	2354	32.06	Oct. 24
Nordhausen.......	Grand Forks	Fred. Kettner...........................	2874	47.66	Aug. 5
North Star........	Greenwood..	Mary T. McMynn and Wm. G. McMynn...	2837	42.14	Sept. 11
Norton	Grand Forks	I. H. Hallett and Herbert R. Davidson....	1569	30.29	Feb. 24
Nubian Fract......	Similkameen	Arthur B. Clabon *et al*..................	133	7.22	Aug. 8
Otis Fract.........	Greenwood .	Francis J. Finucane......................	1280	1.12	Sept. 8
Otter.............	Osoyoos.....	Eclipse M. & M. Co......................	2970	42.88	Sept. 19
P. A..............	Osoyoos.....	Geo. Frederick and Arthur L. Broderick . .	2831	42.55	Mar. 19
Peacock...........	Kamloops...	Thomas Hunter...........................	973	19.98	〃 29
Penstowe	〃 ...	Fredk. J. Fulton	1201	10.03	Dec. 31
Pluto.............	Greenwood..	John P. Anderson *et al*..................	2393	32.56	Mar. 29
Pride of Perth	〃 ..	Jacob C. Haas and Sydney M. Johnson	1253	18.84	Feb. 20
Princess	Kamloops...	Cecil W. Ward and Jas. O. Grahame	832	51.65	Dec. 31
Queen Alexandria..	Similkameen	Ernest V. Bodwell	2753	46.14	Sept. 28
Red Butte Fract...	〃	Chas. Willarson and Peter Johnson........	238	2.56	Nov. 12
Red Warrior.......	Greenwood..	Robert Markin	984	45.95	Mar. 25
Rex	Vernon......	Henry Leydel *et al*......................	3328	51.48	Oct. 28
Richelieu	Greenwood..	Wellington H. Craig and Wm. W. Craig...	942	51.65	Mar. 26
Riverside..........	〃 ..	Samuel T. Larsen and Victor R. Swanson..	1256	40.04	May 7
Ruby Gold.........	Vernon......	John Highman *et al*.....................	2548	51.65	〃 21
Shakespeare.......	Grand Forks	Herbert P. Griffin *et al*	1420	44.60	〃 7
Silver Bell	Greenwood..	Mary T. McMynn and Wm. G. McMynn...	2644	45.87	Sept. 11
Similkameen	Similkameen	John McLean and Francis W. Groves......	136	29.80	April 20
Snow Shoe........	Greenwood..	Wm. Claude Fox	1269	43.16	Dec. 6
Springfield........	〃 ..	Jas. N. Paton, administrator estate of Wm. B. Paton, deceased, and Ralph Smailes ..	2947	51.65	Nov. 16
Starlight	Grand Forks	Isaac H. Hallett and Isaac H. Hallett, administrator estate of Arch. M. Connor ...	2870	21.50	Oct. 25
Sterlingham......	Greenwood..	Wm. Farney *et al*.......................	2953	47.27	Dec. 5
Strathcona........	Osoyoos.....	Eclipse M. & M. Co......................	2968	47.08	Sept. 19
Summit No. 2.....	Similkameen	Frank Lambert	130	40.38	Mar. 28
Sunrise	〃	Edgar E. Burr *et al*.....................	3023	46.75	June 20

Yale.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Tempest Fract	Similkameen	Vermilion Forks M. & D. Co	251	.81	Nov. 7
Tenderfoot	Kamloops	Tenderfoot M. & D. Co., Ltd. (N. P. L.)	882	20.66	May 16
Tiger	Grand Forks	Isaac H. Hallett and Herbert R. Davidson	1567	18.21	Oct. 26
Toboggan	Greenwood	Sydney M. Johnson *et al*	3149	43.08	Sept. 14
Toledo	〃	Wm. Claude Fox	1270	33.52	Dec. 6
Triangle Fract	Similkameen	Herbert H. Thomas *et al*	1832	14.94	Feb. 19
Tripod Fract	Greenwood	No. 7 Mg. Co., Ltd.	3147	3.13	〃 20
True Blue	〃	Wm. Duncan and Geo. Grimason	3011	41.82	Nov. 15
Wheeling	〃	George W. Rumberger and John Mulligan	2135	39.32	Dec. 8
World's Fair Fractl	〃	Geo. R. Naden and John Edwards Leckie	3146	2.46	Feb. 20
Yellow Jacket	Grand Forks	James F. Cunningham and John Mulligan	1327	46.45	Nov. 2

Coast and Vancouver Island.

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Amazon	Quatsino	Wm. Grant and Thomas S. Lippy	182	35.30	Dec. 12
Asa Thor	〃	Yreka Copper Co.	107	27.22	Sept. 23
Baden-Powell	Victoria	Richard T. Godman	141	36.81	Feb. 24
Barkoola	New West'r.	Alonzo Boley *et al*	2067	49.03	〃 25
Bendigo	〃	John T. Humphreys & J. Herrick McGregor	1920	51.65	Mar. 28
Blizzard	Skeena	British America Development Co., *et al*	264	51.41	Feb. 19
Cadet	Nanaimo	Edward Phillips	138	25.39	Oct. 1
Cheapside	New West'r.	George Wagg	1933	41.30	April 12
Copper King	Victoria	M. Howe *et al*	64G	38.28	Nov. 1
Copper Prince	Nanaimo	British America Development Co., Ltd., *et al*	2083	51.65	Mar. 25
Copper Queen	〃	〃 〃 〃	2082	39.06	〃 25
Copper Queen	Victoria	M. Howe *et al*	65G	51.50	Nov. 1
Croydon	New West'r.	Thos. T. Turner	1925	51.31	Sept. 29
Cumberland	Skeena	British America Development Co. *et al*	265	34.26	Mar. 22
Cyclone	〃	〃 〃 〃	263	39.94	Feb. 19
Dartmouth	Skeena	British America Development Co., Ltd.	260	50.48	〃 19
Doubtful Fract	Victoria	Tyee Copper Co., Ltd.	87G	35.74	Nov. 22
Edith Fract	Quatsino	Yreka Copper Co.	82	1.53	Sept. 23
Elva	〃	〃	81	50.47	〃 23
Europe	Nanaimo	Edw. Phillips and Angelo Calori	133	51.60	Oct. 1
Gabriola Fract	〃	Edw. Phillips	139	4.13	Oct. 1
General French	Victoria	Richd. T. Godman	139	28.24	Feb. 24
General White	〃	〃	142	30.41	〃 24
Gladys C.	Nanaimo	Edw. Phillips and Angelo Calori	135	51.65	Oct. 1
Globe	Skeena	British America Development Co., Ltd., *et al*	259	51.65	Feb. 19
Golden Eagle	New West'r.	Alonzo Boley *et al*	2065	50.70	〃 25
Goodall Fract	Nanaimo	Puget Sound Iron Co	234	20.16	April 13
Great Copper Chief	〃	Edw. Phillips and Angelo Calori	134	42.33	Oct. 1
Hampton	Victoria	Charles E. Clarke	77G	36.12	Nov. 1
Happy John No. 1	Alberni	Alvin J. Engvik	607	37.39	June 22
Happy John	〃	〃	606	50.62	〃 22
Helen	Quatsino	William Grant and Chas. S. Lippy	181	47.40	Dec. 12
Hiawatha Fract	〃	Yreka Copper Co.	88	24.57	Sept. 23
Imperial Fract	Victoria	Tyee Copper Co. Ltd	86G	34.71	Nov. 22
Iron Crown	Nanaimo	Laurence Manson	126	51.65	Jan. 27
Iron Knob	Quatsino	Wm. Grant and Thos. S. Lippy	184	51.65	Dec. 12
Josie	Nanaimo	David R. Cowan *et al.*	1906	49.00	Mar. 7
June	Quatsino	Wm. Grant and Thomas S. Lippy	180	47.90	Dec. 12
Key Fract	Nanaimo	Edward Phillips	141	5.36	Oct. 1
Klaanch	〃	Laurence Manson *et al.*	128	32.36	Jan. 27

COAST AND VANCOUVER ISLAND.—*Concluded.*

Claim.	Division.	Grantee.	Lot No.	Acres.	Date.
Klondyke	Victoria	John A. Humbird and Edw. J. Palmer	68G	24.90	Nov. 1
Leonard	Nanaimo	Edw. Phillips and Angelo Calori	136	32.47	Oct. 1
Leopold	New West'r.	Thomas. T. Turner	1963	51.65	Sept. 29
Letitia	Nanaimo	John Mathers *et al*	130	38.80	Jan. 27
Little Bobs	Victoria	Richard T. Godman	140	29.88	Feb. 24
Magnet	Nanaimo	John Mathers *et al*	129	41.69	Jan. 27
Middlesex	Skeena	British America Development Co. *et al*	267	51.53	Mar. 22
Mohican Fract.	Quatsino	Yreka Copper Co.	112	12.25	Sept. 23
Monterey	New West'r.	Alonzo Boley *et al*	2068	45.39	Feb. 25
Mountain King	Quatsino	Yreka Copper Co.	86	49.10	Sept. 23
Mountain Queen	〃	〃	83	31.49	Sept. 23
New Comstock	〃	Yreka Copper Co.	90	51.65	Sept. 23
Nimkish	Nanaimo	John Mathers and Adam Mathers	127	49.03	Jan. 27
Nonesuch	Victoria	Matthew Howe *et al.*	66G	21.58	Nov. 1
Norman	Nanaimo	David R. Cowan *et al.*	1904	42.30	Mar. 7
N. S. Fract.	Quatsino	Yreka Copper Co.	111	22.62	Sept. 23
Olga	〃	Wm. Grant and Thomas S. Lippy	183	50.78	Dec. 12
Omega Fract.	〃	Yreka Copper Co.	113	4.43	Sept. 23
Ougma	Skeena	British America Development Co., Ltd.	269	32.07	Mar. 22
Pocahontas	Quatsino	Yreka Copper Co.	85	49.97	Sept. 23
Porcupine	Nanaimo	David R. Cowan *et al.*	1905	49.40	Mar. 7
Priest	〃	Edward Phillips	137	27.67	Oct. 1
Quatsino Chief	Quatsino	Yreka Copper Co.	87	45.90	Sept. 23
Ready Cash Fract.	〃	Yreka Copper Co.	109	7.90	〃 23
Sardine	Nanaimo	Laurence Manson	131	51.65	Jan. 27
Silver Pine	Skeena	British America Development Co., Ltd	266	39.47	Mar. 22
Sirdar	Victoria	Rich. T. Godman	143	35.09	Feb. 24
Sumatra	New West'r.	Thos. T. Turner	1924	51.45	Sept. 29
Superior	Quatsino	Yreka Copper Co.	106	48.97	〃 23
Texada	Nanaimo	Edward Phillips	132	36.34	Oct. 1
Thelma Fract.	Victoria	Tyee Copper Co	85G	27.23	Nov. 22
Thistle	New West'r.	J. Herrick McGregor	1970	46.43	Feb. 20
Toledo	〃	Alonzo Boley *et al*	2069	42.89	〃 25
Toothpick Fract.	Nanaimo	Edward Phillips	140	1.65	Oct. 1
Tress Fract	New West'r.	George Wagg	1934	19.80	July 12
Tuscarora.	Quatsino	Yreka Copper Co.	84	51.65	Sept. 23
Vancouver	Skeena	British America Development Co., Ltd., *et al*	261	8.84	Feb. 19
Victoria	〃	〃 〃 〃	262	36.39	〃 19
Volunteer	Nanaimo	Edw. Phillips and Angelo Calori	131	45.12	Oct. 1
Vulcan	〃	Wm. H. McLaughlin	132	35.50	Jan. 27
Washington	New West'r.	Alonzo Boley *et al*	2066	51.48	Feb. 25
Wide West	Nanaimo (Texada)	William Lee	65	51.65	June 21
Xiphis	Skeena	British America Development Co., Ltd., *et al*	268	28.74	Mar. 22
Yreka Fractional	Quatsino	Yreka Copper Co.	89	15.34	Sept. 23

GOLD COMMISSIONERS AND MINING RECORDERS.

Mining Districts and Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Cassiar District	Telegraph Creek	James Porter		
Stikine Division	〃		James Porter	
Liard	〃		〃	
Teslin	〃		〃	
Sub-office	Atlin			E. J. Thain.
Atlin District	Atlin	J. A. Fraser		
Atlin Mining Division	〃		E. J. Thain	
Sub-office	Wells			J. J. McKenna.
Skeena District	Port Simpson	J. Flewin		
Skeena Mining Division	〃		John Flewin	H. C. Flewin.
Sub-office	Masset			C. Harrison.
〃	Kitsilas			S. A. Singlehurst.
〃	Kitimat			Jas. Steele.
〃	Essington			Chas. Berryman.
〃	Skidegate, Q. C. I.			W. H. Dempster.
〃	Bear River			John Conway.
〃	Hazelton			John Kirby.
〃	Lorne Creek			F. E. Holt.
Bella Coola	Victoria	W. S. Gore	W. S. Gore	
Omineca District	Victoria	W. S. Gore		
Omineca Mining Divisi'n	Manson Creek		Ezra Evans	
Sub-office	Tom Creek			Vacant.
〃	Fort St. John			F. W. Beatton.
〃	Fort St. James			Alex. C. Murray.
Cariboo District	Barkerville	John Bowron		
Cariboo	〃		John McKen	
Quesnel	Quesnel Forks		W. Stephenson	
Lillooet District				
Clinton	Clinton	F. Soues	F. Soues	
Lillooet	Lillooet	C. Phair	C. Phair	
Kamloops District	Kamloops	G. C. Tunstall		
Kamloops	〃		E. T. W. Pearse	
Sub-office	Nicola			Geo. Murray.
Ashcroft	Ashcroft		H. P. Christie	
Similkameen	Princeton		H. Hunter	
Sub-office	Nicola			Geo. Murray.
〃	Hedley			F. M. Gillespie.
Yale	Yale		Wm. Dodd	
Vernon District	Vernon	L. Norris		
Vernon	〃		H. F. Wilmot	
Boundary District				
Greenwood	Greenwood	W. G. McMynn	Geo. Cunningham	
Sub-office	Vernon			H. F. Wilmot.
〃	Camp McKinney			H. Nicholson.
〃	Beaverdell			A. Megraw.
Grand Forks	Grand Forks	S. R. Almond	S. R. Almond	
Osoyoos	Fairview	C. A. R. Lambly	J. R. Brown	
Sub-office	Olalla			John McDonald.
〃	Hedley			F. M. Gillespie.
Golden District	Golden	J. E. Griffith		
Golden	〃		F. C. Lang	Colin Cameron.
Windermere	Wilmer		E. J. Scovil	

Mining Districts and Divisions.	Location of Office.	Gold Commissioner.	Mining Recorder.	Sub-Recorder.
Fort Steele District	Cranbrook	J. F. Armstrong		
Fort Steele Division	〃		Jas. Hislop	
Sub-office	Elkmouth			M. Phillipps.
〃	Fernie			L. Forbes.
〃	Kimberley			Vacant.
〃	Moyie			Fred. J. Smyth.
〃	Steele			Joseph Walsh.
Revelstoke District	Revelstoke	Fred Fraser		
Revelstoke Division	〃		W. E. McLauchlin.	
Illecillewaet	〃		〃	
Lardeau	Camborne		G. Sumner	
Trout Lake	Trout Lake		F. C. Campbell	
Sub-office	Poplar Creek			J. Simpson.
Slocan District	Kaslo	E. E. Chipman		
Slocan Mining Division	New Denver		Angus McInnes	
Sub-office	Sandon			E. M. Sandilands.
Slocan City Mining Div.	Slocan City		H. R. Jorand	
Ainsworth	Kaslo		A. Lucas	
Sub-office	Howser			W. Simpson.
〃	Poplar Creek			J. Simpson.
Nelson District	Nelson	R. Renwick		
Nelson Mining Division	〃		C. D. Blackwood	
Sub-office	Ymir			P. J. Gleazer.
〃	Creston			J. Wilson.
Arrow Lake	Nakusp		W. Scott	
Sub-office	Vernon			H. F. Wilmot.
Rossland District	Rossland	John Kirkup		
Trail Creek Division	〃		J. A. Hooson	
Nanaimo District	Nanaimo	Marshal Bray		
Nanaimo Division	〃		Marshal Bray	
Sub-office	Alert Bay			W. Woollacott.
Alberni District	Alberni	A. L. Smith		
Alberni Mining Division	〃		A. L. Smith	
Clayoquot	Clayoquot		W. T. Dawley	
Quatsino	Yreka		B. W. Leeson	
Victoria District	Victoria	W. S. Gore		
Victoria Mining Division	〃		G. V. Cuppage	
New Westminster	New Westminster.		C. C. Fisher	
Sub-office	Harrison Lake			L. A. Agassiz.
〃	Vancouver			R. J. Skinner.
〃	Chilliwhack			J. Pelly.

TABLE OF CONTENTS.

Subject.	Submitted by	Page.
Mineral Production	Provincial Mineralogist	7
Statistical Tables	〃 〃	7 to 14
Progress of Mining during Year	〃 〃	15
Bureau of Mines—Work of Year	〃 〃	30
Assay Office Report	〃 Assayer	31
Examination of Assayers	〃 〃	33
〃 Coal Mine Officials	〃 Mineralogist	34
Cariboo District— Report on	Gold Commissioner	37
Quesnel Mining Division 〃	〃	37
Cariboo 〃 〃	〃	42
Quesnel 〃 〃	Mining Recorder	50
Omineca District 〃	Gold Commissioner	52
Cassiar District:		
Atlin District—Report on	Provincial Mineralogist	55
〃 〃	Gold Commissioner	83
Teslin, Liard and Stikine Mining Divisions	〃	94
〃 Notes on	Provincial Mineralogist	97
Skeena Mining Division—Report on	Gold Commissioner	99
East Kootenay District:		
Fort Steele Mining Division—Notes on	Provincial Mineralogist	104
〃 〃 Report on	Gold Commissioner	107
Golden 〃 〃	〃	112
Windermere 〃 〃	Mining Recorder	113
West Kootenay District:		
North-West Kootenay—Report on	Gold Commissioner	115
Revelstoke Mining Division 〃	Mining Recorder	115
Trout Lake 〃 〃	〃	116
Lardeau 〃 〃	〃	119
Nelson 〃 〃	Provincial Mineralogist	122
〃 〃 〃	Gold Commissioner	135
Arrow Lake 〃 〃	Mining Recorder	146
Slocan District, 〃	Provincial Mineralogist	147
Ainsworth Mining Division 〃	〃	148
Slocan City 〃 〃	〃	163
Slocan 〃 〃	〃	171
Slocan District 〃 〃	Gold Commissioner	197
Ainsworth Mining Division 〃	〃	197
Slocan 〃 〃	Mining Recorder	200
〃 City 〃 〃	〃	203
Trail Creek 〃 (Rossland) 〃	Gold Commissioner	205
Boundary District:		
Greenwood Mining Division—Report on	Gold Commissioner	209
Grand Forks 〃 〃	〃	221
〃 〃 Notes on	Provincial Mineralogist	223
Osoyoos 〃 Report on	Gold Commissioner	225
Vernon District:		
Vernon Mining Division—Report on	Gold Commissioner	228
Yale District 〃	〃	229
Kamloops Mining Division 〃	〃	229
Ashcroft 〃 〃	Mining Recorder	234
Yale 〃 〃	〃	235
〃 〃 〃 Siwash Creek	Provincial Assayer	236
Similkameen 〃 〃	Mining Recorder	238
Lillooet District:		
Lillooet Mining Division—Report on	Gold Commissioner	240
Clinton 〃 〃	〃	242
Coast District:		
Alberni Mining Division—Report on	Gold Commissioner	243
Clayoquot 〃 〃	Mining Recorder	244
Quatsino 〃 〃	〃	245
Nanaimo 〃 〃	Gold Commissioner	246
Stone Quarries of Coast 〃	Provincial Assayer	248

TABLE OF CONTENTS.—*Concluded.*

SUBJECT.	SUBMITTED BY	PAGE.
Coast District.—*Concluded.*		
Victoria Mining Division—Report on	Mining Recorder	252
〃 〃 Notes on	Provincial Mineralogist	254
New Westminster Mining Division—Notes on	〃 〃	261
〃 〃 〃	〃 Assayer	266
〃 〃 Report on	Acting Mining Recorder	267
Inspection of Metalliferous Mines	Inspectors' Reports	269
List of Accidents	〃	271
Coal Mining in British Columbia	Provincial Mineralogist	274
Inspection of Coal Mines	Inspectors	277
Vancouver Island and Coast Collieries	〃	277
East Kootenay District Collieries	〃	280
Accidents in 1904—Tabulated	Provincial Mineralogist	288
〃 from 1895 to 1904—Tabulated	〃 〃	289
〃 Detailed statement, V. I. Collieries	Inspectors	290
〃 〃 Crow's Nest Collieries	〃	293
Crown Grants for Mineral Claims issued in 1904	From Lands and Works Records	295
List of Gold Commissioners and Mining Recorders of Province	From Provincial Secretary's Office	303
Table of Contents	Provincial Mineralogist	305
Index, alphabetical, of subjects	〃 〃	307
Illustrations, List of	〃 〃	317
Cataloguing slips, cards for libraries	〃 〃	319

INDEX.

A.

Page.

- Accidents:
  - In Metalliferous Mines 271, 272, 273
  - In Coal Mines 289, 290, 291, 292, 293
  - Tables of 273, 288, 289
- *Ah Quay* mine 44
- AINSWORTH MINING DIVISION:
  - Report of Provincial Mineralogist 148
  - Report of Gold Commissioner 197
  - Ainsworth camp 149, 199
- *Ajax Group* (Kamloops) 230
- *Alabama* 45
- *Alamo-Idaho* mine 182
- ALBERNI DISTRICT:
  - Alberni Mining Division 243
    - Report of Gold Commissioner 243
- Alberni canal 243
- *Alberta* 204
- Alert bay 248
- Alexander creek, Lillooet 241
- *Alice* mine 133, 145, 270
- Alice Broughton Mining Company 133
- *Alpha Group* 178
- Amalgamated McKee Hydraulic Company 74, 87
- *American Boy* 202
- *American Girl Group* 99
- American and B. C. Hydraulic Mining Co 143
- *Anaconda Group* 78
- Anderson Lake M. & M. Co 240
- Anglo-Slocan Syndicate 175
- Antler creek 46
- *Antoine* 195, 201
- *Apex Group* 225, 227

Page.

- Argenta-East Kootenay trail 161
- *Argenta* mines 162
- Argenta Mines Company 198
- Argenta townsite 160
- *Argentite* 203
- *Arlington* (Erie) mine 129, 142
- Arlington Mines, Ltd. (Slocan) 165, 203
- ARROW LAKE MINING DIVISION:
  - Report of Mining Recorder 146
- ASHCROFT MINING DIVISION:
  - Report of Mining Recorder 234
- Aspen Grove camp (Similkameen) 239
- Assay Office, Provincial 31
  - Free determinations by 31
  - Special analyses 32
  - Instruction to Students 32
- Assayers' Examinations 33
- Assayers, List of Licensed 33
- Athabasca-Venus Gold Mining Company 138
- *Athelstan-Jackpot* 211, 222
- ATLIN MINING DIVISION 55
  - Report of Provincial Mineralogist on 55
  - Report of Gold Commissioner on 83
  - Gold-bearing deposits of 58
  - Atlin gold output 12
    - Royalty paid on 94
  - Atlin placers, discovery of 56
- Atlin Lake Hydraulic Company 71
- Atlin Lake Gold Mining Company 88
- Atlin and Willow Creek Gold Mining Company 85
- Atlin-Tuya Coal Prospecting Syndicate 97
- *Atlin-Nome* claims (Nelson M. D.) 126, 142

B.

- *Ballarat* 243
- *Baltimore Group* 156, 199
- *Bannockburn* 204
- *Barbara* 212
- Barkley sound 251
- *Bayonne Group* 131, 145
- B. C. Copper Co 214
  - Smelter 217
    - Tonnage treated at 219
- *B. C. mine* 221
- B. C. Standard Mining Company 127
- Bear Creek (Similkameen) 238
- Bear Hydraulic Co 47
- Bear lake 196, 199
- *Beatrice* 121
- *Beavis Group* 78
- *Bell Group* 199
- BENNETT MINING DIVISION 55
- Bennett lake 55
- Berry Creek Mining Co 94
- Bessemerizing plant, B. C. Copper Co.'s smelter 218
- BIG BEND DISTRICT 115
- *Bighorn Group* 239
- Birch creek (Atlin) 71, 88
- *Bismark Group* and mine 158, 198
- *Black Cloud* 204
- Black & Grant's claim 88
- *Black Fox* 198
- Black Fox Mining Co 159
- *Blandfield* 204
- Blue Canyon Partnership 86
- *Blue Bell* 148
- *Blue Bird* 201
- *Bob Fraction* 201
- Bog iron, occurrence of—Quatsino Mining Div 245
- Bonanza Mining Co 240
- *Boomerang Group* 239
- *Bosun* mines 180
- Boulder Mining Co., Ltd 238
- Boulder creek (Atlin) 70, 88
- BOUNDARY DISTRICT 209
  - Greenwood Mining Division 209
    - Report of Gold Commissioner 209
  - Grand Forks Mining Division 221
    - Report of Gold Commissioner 221
  - Osoyoos Mining Division 225
    - Report of Gold Commissioner 225
  - Output of, for 1904 209
  - Tonnage of mines for 1904 209
- Boundary smelters 217

Page.
Bounty 216
Bounty on lead, effect of:
  Ainsworth Mining Division 149
  East Kootenay District 26, 104
  Table showing, *Highland* mine 153
Breadwinners 53
Brey Fogle 221
Brick, manufacture of 23
  Fire, 〃 23
Bridge river 240
Bridge River & Lillooet G. M. Co., Ltd 241
Bridge river, south fork of 241
Bridge River Dev. Co 241
Briggs Portage Stone Quarry 250
BRIGHT DISTRICT (Nanaimo) 247
Britannia Copper Syndicate 261
Britannia Group—Notes by Prov. Mineralogist. 261
  Average ore value 264
British America Dredging Co 20, 63, 85
British Columbia Dredging Co 73, 86

Page.
Broken Hill Mining & Development Co 124, 141
Brooklyn-Stemwinder 211
Broomhead Syndicate 234
Brown's camp 221
Buffalo Mining Company 115
Bugaboo creek (Victoria Mining Division) 253
Bull creek 57, 90
Bull River Mining and Power Co 110
Bull Creek Hydraulic Syndicate 90
Bulldog 227
Buller 225
Bullion (*see* Cariboo Consol. Hyd. Co.)
  Mine at 37
Bullion Group 225
Bunk-house, model, at *Emily Edith* mine 176
Bureau of Mines, work of 30
Burnt Basin camp 222
Butcher Boy 216
Byron N. White Co 184

C.

Cadwallader creek 240
Caledonia Gold & Silver Mining Co 53
California 202
Calumet and Hecla 203
Camp Hammell Mining Partnership 86
Canadian American Mining Company 102
Canadian creek 48
Canadian Pacific M. & M. Co 156
Canyon creek-Bennett Mining Division 56
Capella Group 179, 202
Capilano creek 267
Carbonado Collieries 280, 285
CARIBOO DISTRICT 37
  Cariboo Mining Division 42
    Report of Gold Commissioner 42
  Quesnel Mining Division 37
    Report of Gold Commissioner 37
    Report of Mining Recorder 50
Cariboo Gold Fields, Ltd 42
Cariboo Consolidated Mines 43
Cariboo Deeps 46
Carmi 216
Carpenter creek 181, 193, 196
Cascade creek 197
Cascade Copper Mining Co 243
Cascade (Alberni) 243
CASSIAR DISTRICT—
  Atlin Mining Division 55
    Report of Provincial Mineralogist 55
    Report of Gold Commissioner 83
  Chilkat Mining Division 55
    Report of Provincial Mineralogist 55
    Report of Gold Commissioner 55
  Bennett Mining Division 55
    Report of Provincial Mineralogist 55
    Report of Gold Commissioner 55
CASSIAR DISTRICT—northern portion of—(Teslin, Liard and Stikine Mining Divisions) 94
    Report of Gold Commissioner 94
Cayoosh creek—Lillooet 240-241
Cement, Portland, manufacture of 256
Central Camp 222
Central 133
Centre Star Mining Company 206
Chambers Group 191
Chapleau mill 169-170, 204
Cheam range 266
Cherry Creek Mining Co 228
Chilliwhack 266-267
Chilliwhack river 266-267
Chilkat Mining Division 55
China Creek 46
China Creek Hydraulic Co 46
Christina Lake Camp 222
Cinderella 182, 201
Cinnabar mines (Kamloops) 229
Clayoquot Mining Division 244
Clear Grit 48
Cliff 207
Clinton Mining Division 242
  Report of Gold Commissioner 242
Club 170, 203
Coal deposits, development ot—
    Kamloops 233, 275
    Nicola 275
    Enderby 233
    East Kootenay 110, 275
    Quatsino Sound 245
    Peace river 275
  Mine officials—Examination of 34
  Mines Regulation Act—prosecutions under 286
  Mining in British Columbia 274
    Table showing distribution of output 274
  Vancouver Island Collieries 275
    Summary of returns from 276
    Report of Inspectors on 277
    Western Fuel Company 277
    Wellington Colliery Company 278
    Accidents in, detailed statement of 290
  Crow's Nest Pass Collieries 280
    Summary of returns from 281
    Report of Inspectors on 280
    Michel Colliery 283
    Coal Creek Colliery 282
    Carbonado 〃 285
    Accidents in, detailed statement of 293
  Mines—Accidents in B. C., tabulated statement of 288
  Mines—Accidents in B. C., tabulated statement of in ten years, 1895-1904 289
  Output for year—Statistics and comment, 11, 18, 19
  Hill (Kamloops) 239
Coal Creek Collieries 280, 282
Cody 193, 202
Coffee creek 200
Coke statistics, distribution of output, etc., (*see* tables for coal).
  Ovens, Crow's Nest Pass Coal Co 286

Page.
Collieries, producing, of Province 18
Colorado and Hamilton 204
Columbia Hydraulic Mining Company 86
Columbia-Kootenay 207
Combination 203
Comox Colliery 18, 279
Comstock 201
Comstock Group 176
Comstock concentrator 177
Consolation creek 57, 97
Consolidated Cariboo Hydraulic Mining Co. .37, 51
Contents, table of 305
Cooper creek 197
Copper, average assays of ore from various camps 21
Copper island 80
Copper King 226
Copper mountain (Similkameen) 238
Copper Mountain Mining and Development Co. . 245
Copper production of Province:
  Boundary District 21
  Rossland 〃 21
  Coast 〃 21
  Yale-Kamloops 〃 21
  Nelson 〃 21
  Other 〃 21

Page.
Copper Queen 247
Copper Standard Group 239
Cordillero Mining Co. 247
Cork mine 159, 198
Cornell 247
Cowboy 199
Cowichan Lake District (Nanaimo) 247
Cranbrook, mineral claims near 109
Crawford creek 200
Cripple Stick 203
Crown grants issued in 1904 295
Crown Group hydraulic leases 86
Crow's Nest Pass Coal Co 280
  Summary of returns from 281
  Coal Creek Colliery 282
  Michel 〃 283
  Carbonado 〃 285
  Detailed statement of accidents 293
  Output of coal 19
  〃 coke 19
Culver classifier, *Slocan Star* mill 186
Cumberland 183
Cunningham creek 47
Curry Group 216

D.

Dakota 232
Daly Reduction Co. 227
Dardanelles creek 195
Deadwood camp 214
Delaney Group 231
Delphi Group 247
Delphine Group 113
Determinations of mineral, free 31
Development, general, of year in various districts 25
Dewdney trail 131
Dewey Group 230
Dolphin Group 226
Dominion Copper Co. 209
Dredging for gold:
  Atlin Mining Division 63, 73

Dredging for gold—*Concluded.*
  Kamloops 233
  Lillooet 241
  Fraser river 234
Dresser, Prof. J. A., report of, on specimens of rock from Siwash creek. 236
Drift mining in Atlin 67
Dry Hill Hydraulic Mining Company 101
Dry lead ores, Slocan City Mining Division 163
Duncan United Mines, Ltd. 133
Duncan river 197
  West fork of 198
Dundee Gold Mining Company 125
Dundee mine 125, 141
Dunsmuir district (Nanaimo) 247

E.

Eastern Group hydraulic leases 84
Echo Group 132
Echo and *Alameda* 199
Eclipse Mining and Milling Co. 225
Edison (Quatsino) 245
Edison (Slocan) 204
Edith Fraction (*Britannia*) 263
Eight-Mile creek (Slocan lake) 202
Eight-Mile lake (Cariboo) 47
Elgin 189
Elk river, Clayoquot M. D. 244
Elkhorn Group 213, 226
Elmore Process concentrator 205, 207
Emily Edith Group 176
Emma 136, 221

Emmett Group 204
Empress (Ainsworth M. D.) 199
Empress Group (New Westminster M. D.) 263
Engineer Group (Atlin) 80
English Counties Hydraulic Syndicate 90
Enterprise 171, 204
E. P. U. 213
Erie Placer Company 143
Eureka Group 140
Eva Gold Mines, Ltd. 119
Evans Black Jack 53
Evening Star 231
Examinations of Assayers 33
  Coal Mines Officials 34
Extension colliery 278

F.

Fairview camp (Osoyoos) 225
Fairview (*Britannia*) 263
Ferguson Mines, Ltd. 116
Fern mine 144
Fernie, mineral claims in vicinity of 108
Findlay river 53
First of May Hydraulic Co. 43
Fish Lake Group 239

Fisher Maiden Group 177, 201
Flagstaff Group 226
Fluor spar, occurrence of 134
Foghorn 125, 141
Forest Rose Hydraulic Co. 43
FORT STEELE MINING DIVISION 104
  Notes on by Provincial Mineralogist 104
  Report of Gold Commissioner 107

Page.

- FORT STEELE MINING DIVISION—*Concluded.*
  - Steele, mineral claims in vicinity of 107
- Forty-third Mining and Milling Co 52
- Four-Mile creek 201
- Fourth of July creek 57

Page.

- Franklin camp 222
- Fraser River Gold Dredging Co. 234
- Fraser river, hydraulic mining on 48
- Free determinations of minerals at Prov. Assay O. 31
- *Full Moon* 79

G.

- Gabriola island stone quarry 250
- *Gale Group* 228
- Galena Mines Co 174
- *Galena Farm* 174
- *Garnvillo* 228
- Germansen creek 53
- *Gibson* 198
- Glacier creek (New Westminster Min. Div.) 266
- Gladstone Hydraulic Mining Partnership 86
- Gladys lake 57
- *Gladys* 243
- *Gleaner Group* 81
- Glen Iron Mining Co 229
- *Gloster* 222
- Goat mountain 178, 201
- *Goat* 199
- *Golconda* 226, 234
- Gold Commissioners, list of 303
- *Gold Drop Fraction* 216
- Gold dust, purchase of, by Government 31
- Gold production of Province 12, 20
  - From placer mining 12, 20
    - Lode mining 12, 21
- Gold Finch Mining Company 121
- *Gold Hill Group* 139
- Gold Run (Atlin) 65, 66
- *Gold Star Group* 79
- *Golden Eagle* 221
- *Golden Gate* (Similkameen) 239
- Golden Cache Co 240
- GOLDEN MINING DIVISION 112
  - Report of Gold Commissioner 112
- Golden Monarch Mining & Milling Co 125, 141
- *Goodenough* 192
- Goose creek 51
- Graham creek 57, 90
- *Granby* mines 209
  - Output of 210
  - Connection with G. N. Ry 210
  - Smelter 210, 221
    - Tonnage treated at 211
- Granite island stone quarry 251
- Granite creek (Similkameen) 238
- *Granite-Poorman* mine 133
- *Grant* 199
- *Graphic* 203
- *Grass Roots* 231
- Great Central lake (V. Is.) 243
- Great Northern mines 118
- *Great Western Group* 234
- *Greenhorn* 139
- *Green Mountain Group* 227
- Green & Co 66
- Greenwood 209
  - Camp 210, 222
- Gribbell island 102
- Gribbell Island Copper Company 102
- *Gridiron Group* 55
- Grouse creek 46

H.

- Haddington island stone quarry 248
  - Analysis of building stone 249
- Hall Mines, Ltd 122
- Hall Mining & Smelting Co 136
- Hall creek 198
- Hamill creek, mining on 160, 161, 198
- *Happy John Group* 243
- Hardscrabble creek 49
- Hardscrabble Company (Skeena) 101
- Harper's camp 51
- Harrison lake 267, 268
- Hastings (B. C) Exploration Syndicate 129
- *Hayward* 42
- *Hecla Group* 230
- Hedley, camp 227
- *Helen* 213
- *Hesperus* and *Betts* 221
- *Hewitt Group* 174, 202
- Highland (Kootenay, B. C.) Mining Co 149
- *Highland* mine 149, 199
- *Highland* Mine Concentrator 149
  - Cost of operating 154
- *Highland Light* 204
- Highland valley 234
- Highlander Mining & Milling Co 154, 200
- *Highlander* mine 154, 200
- Hobson, J. B., report of 38
- *Home Run* or *Mowich Group* 180
- *Homestake* (Kamloops) 232
- *Homestead-Silent Friend Group* 226
- Horsefly river 37, 51
- Hot Springs camp 148
- Howe sound 261, 267
- Howson creek 182
- *Hunter V* 127, 136, 142
- Hunter claims 102
- Hydraulic mining:
  - Lillooet District 241
  - Nelson 〃 143
  - Atlin 〃 56
  - Cariboo 〃 37
  - Omineca 〃 52
  - Northern Cassiar 〃 94

I.

- *Idaho-Alamo* mine 182, 201
  - Mill 183
- ILLECILLEWAET MINING DIVISION 115
- Illustrations, *see* index of.
- *Imperial Group* 74
- *Indian Chief Group* 244
- Inspection of Metalliferous Mines 269
  - Report of Inspectors on:
    - Slocan District 269
    - Lardeau 〃 269
    - Ainsworth 〃 269
    - Nelson 〃 269

Page.
Inspection of Metalliferous Mines:
  Report of Inspectors on—*Concluded.*
    Ymir District 269
    Trail " 269
    Boundary " 269
    E. Kootenay " 270
Interior 234
International Gold Mining Co. 235, 236
Iowa-Lillooet Gold Mining Co. 241
Irene Group 197
Ironclad (Victoria M. Div.) 253
Iron Mask Group 229
Iron ore 22
Isabel and *Barbara* 92
Ivanhoe mine 189, 200
  Mill 190
I. X. L. (Slocan City) 203
I. X. L. (Trail creek) 207
I. X. L. (Osoyoos) 225

J.

Jack of Clubs creek 48
Jacko lake (Kamloops M. D.) 229
Jackson creek 199
Jackson mines 199
Jamieson creek 232
Jane (*Britannia Group*) 262
Jervis inlet 267
Joe Chamberlin 228
Jo-Jo 182, 202
Jubilee Group 247
July creek 221
Jumbo (New Westminster M. D.) 267
Jumbo (Grand Forks M. D.) 223
Jumbo Gold Mining Co. (Trail creek) 206
June Group 245
Juno 138
Juno Mines Company 138

K.

KAMLOOPS MINING DIVISION 229
Kamloops Coal Development Co. 229
Kamloops lake 229
Kaslo creek 160, 199
Kaslo creek, south fork 158, 197, 198
Kaslo Sampling Works 196
Keating 256
Keithley creek 41, 50
Kennedy mountain (Similkameen) 238
Kent & Company 69
Keremeos valley 225
Keremeos creek camp, upper 226
Keremeos-Pontiac Company 227
Kettle river, west fork of 216
Kilo 168, 204
Kimberley (Kamloops) 229
King Solomon (New Westminster M. D.) 266
King Solomon (Victoria M. D.) 253
King Solomon Mines Co. (Ainsworth) 157, 199
Kitimat arm 102
Kitsilas canyon, mineral claim at 101
"Knock system" of blasting 248-250
Kokanee creek 140
Koksilah and Colvin mountains (Victoria M. D.) 253
Kootenay Belle Group 144
Kootenay Ore Co. 197
Kootenay Central Railway 113

L.

Lady Franklin 204
La Fontaine mine 43
Lake creek 197
Lake View Group 76
Lancashire Lass 221
LARDEAU MINING DIVISION:
  Report of Mining Recorder 119
Last Chance mine 201, 214
Laverdiere Group 79
Lavina Group 161
Lead bounty, effect of, table showing, *Highland* mine 153
Lead Bounty, effect of, East Kootenay 26, 104
Lead, production of 9, 12, 21
Legal 168
Lemon creek 204
Le Roi and *Scotia Group* (Osoyoos) 226
Le Roi Mining Company 206
Le Roi No. 2 Co. (*Josie*, etc.) 206
Le Roi No. 2 Company's concentrator 205
Lenora 252
L. H. 173, 202
Lightning Creek Gold Gravels and Drainage Co. 44
Lightning creek 43
Lightning peak camp 224
Lightning Peak Group 224
LILLOOET DISTRICT 240
  Lillooet Mining Division 240
    Report of Gold Commissioner 240
Lillooet Hydraulic Lease 241
Limonite, occurrence of, Quatsino Mining Div. . 245
Lincoln 267
Liverpool Group 239
Lode mines, production of 10, 18
London and B. C. Gold Fields 122
Lorne creek, hydraulic mining on 101
Lost creek 53
Lowhee mine 44
Loyal Group 247
Luce Company 42
Lucky Boy 117
Lucky Jack (Poplar creek) 119
Lucky Jim 196, 202
Lynn creek 267

M.

Mabon 204
Magnesite deposit at Atlin 82
Majestic 202
Mammoth bluff (*Britannia*) 262
Mammoth 121
Manery Group 225
Manhattan 222
Manson creek 52
Marble at Beaver cove 249
  at Texada island 251
  on West Coast Vancouver Island 251
Marble Bay mines 246

Page.

- *Marion* ... 202
- Mark creek, mineral claims on ... 109
- Martin & Clark ... 67
- Marysville smelter ... 106
- *Mayeta Group* ... 203
- *Mayflower Group* ... 268
- Mayflower M. & M. Co ... 268
- *Mayflower* (Omineca) ... 53
- *May* and *Jennie* ... 138
- *McAllister Group* ... 182
- McGillivray creek ... 240
- McGuigan basin ... 194, 196
- McKee creek ... 73, 87
- McKee Creek Consolidated Hydraulic ... 87
- *McKinley* ... 223
- McKinley mountain ... 223
- *McKinnon* mine ... 53
- *McPhail Group* ... 228
- *Meadow Group* ... 146
- *Mercury* ... 202
- Metalliferous Mines, inspection of ... 269
  - Report of Inspectors on:
    - Slocan District ... 269
    - Lardeau 〃 ... 269
    - Ainsworth 〃 ... 269
    - Nelson 〃 ... 269
    - Ymir 〃 ... 269
    - Trail 〃 ... 269
    - Boundary 〃 ... 269
    - East Kootenay 〃 ... 270
- Metropolitan Gold & Silver Mining Co ... 117
- Michel Collieries ... 280, 283
- *Millie Mack* ... 146
- MINERAL PRODUCTION OF BRITISH COLUMBIA:
  - Statistical tables—
    - Table I.—Total production for all years up to and including 1904 ... 7
    - Table II.—Production for each year from 1890 to 1904 ... 7
    - Table III.—Diagram showing total production, also production of lode and coal mines ... 8
    - Table IV.—Amount and value of mineral products for 1902, 1903, 1904 ... 9
    - Table V.—Production of mineral by Districts and Divisions ... 9
    - Table VI.—Yield of placer gold per year to date ... 10
    - Table VII.—Production of lode mines ... 10
    - Table VIII.—Coal and coke production per year to date ... 11
    - Table IX.—Production in detail of the metalliferous mines for 1901, 1902, 1903 and 1904 ... 12, 13
    - Table X.—Graphic table showing comparative mineral production for 1904, of B. C. and other Provinces of the Dominion ... 14

Page.

- MINERAL PRODUCTION OF BRITISH COLUMBIA:
  - Statistical tables—*Concluded.*
    - Table (graphical) of mineral production for all years to date ... (facing p. 14
    - Table showing distribution of shipping mines and men employed ... 16
    - Table of coal production and particulars of employees ... 19, 274
    - Tables of accidents in mines ... 271, 273
    - 〃 〃 collieries ... 288
- Mines shipping, 1904, table of ... 16
  - Men employed in ... 16
- Mining, progress of, review of year ... 15
- Mining Recorders, list of ... 303
- Minnesota Silver Co ... 189
- *Mollie Hughes Group* ... 178, 201
- *Molly Gibson* mine ... 140
- *Monarch Group* ... 146
- Monashee mountain ... 228
- *Monitor* (Alberni) ... 243
- *Monitor No. 1 Fraction* (Alberni) ... 243
- *Monitor* (Slocan) ... 181, 201
- Monitor & Ajax Fraction Company ... 181
- *Monte Carlo Group* ... 229, 230
- *Monterey* ... 222
- *Montezuma* ... 158, 198
- Montreal & Boston Mines ... 211
- Montreal & Boston Con. M. & S. Co ... 209
  - Smelter ... 220
  - Tonnage treated at ... 220
- Moresby island, coal on ... 103
- *Morgan* ... 228
- *Morning Star* ... 225
- *Morrison* mine ... 211
- Mosquito creek ... 44
- *Mother Lode* ... 209, 214
- *Mountain Rose* ... 221
- *Mountain Chief* ... 180
- *Mountain Con.* ... 193, 201
- *Mountain View* (Similkameen) ... 239
- Mount Baker mines ... 266
  - Notes on, by Prov. Assayer ... 266
- Mount Baker & Yale Mining Co ... 235
- *Mount* claim ... 43
- *Mount Ida* ... 232
- Mount Mystery (Nanaimo) ... 247
- Mount Sicker camp ... 252
- *Mount Zion* ... 226
- *Mowich* or *Home Run Group* ... 180
- Moyie, mineral claims near ... 109
- *Mucho Oro* ... 43
- Munro mountain claims ... 74
- Museum, mineral, Provincial ... 32
- *Myrtle Group* ... 203

N.

- Nahlin river ... 98
- NANAIMO DISTRICT:
  - Nanaimo Mining Division ... 246
    - Report of Gold Commissioner ... 246
  - Jubilee Mining and Development Co ... 247
  - Colliery ... 277
- *Nansen* ... 204
- *Napanee Group* ... 216
- National Hydraulic Mining Co ... 48
- *Neepawa* ... 204
- NELSON DISTRICT ... 122
  - Nelson Mining Division ... 122
    - Report of Provincial Mineralogist ... 122
    - Report of Gold Commissioner ... 135

- NELSON DISTRICT—*Concluded.*
  - Arrow Lake Mining Division ... 146
    - Report of Mining Recorder ... 146
- Nelson island ... 267
  - Stone quarries ... 251
- Nelson and Slocan Development Co ... 156
- Nesaquatch creek ... 267
- Newcastle island stone quarry ... 250
- New Denver, mining in vicinity of ... 178
  - Report of Provincial Mineralogist ... 178
- New Fairview Corporation ... 225
- NEW WESTMINSTER MINING DIVISION:
  - Notes by Provincial Mineralogist ... 261
  - Report of Mining Recorder ... 267

Page.
Newitt and Mullen mine 53
Nickel Plate (Osoyoos) 227
Nicola, claims in vicinity of 234
Nicola Valley coals, analysis of 28
Nimrod Syndicate 75
None Such 214
Non Union hydraulic lease 89
Nooksack river 266
Noonday 173
Nootka 251
North Columbia Gold Mining Co 59, 62, 77, 84
NORTH-EAST KOOTENAY DISTRICT:
  Golden Mining Division 112
    Report of Gold Commissioner 112
  Windermere Mining Division 113
    Report of Mining Recorder 113
North Fork Company 130

Page.
North Star mine 105, 270
North-Western Construction Co 250
NORTH-WEST KOOTENAY DISTRICT:
  Revelstoke Mining Division 115
    Report of Mining Recorder 115
  Illecillewaet Mining Division 115
  Trout Lake Mining Division 116
    Report of Mining Recorder 116
  Lardeau Mining Division 119
    Report of Mining Recorder 119
Northern Light 203
Northern Mines, Limited 21
Northfield Colliery 278
Number One 200
No. 3 creek camp, Windermere Mining Division 114
No. 37 222

O.

Observatory Group 216
Observatory inlet, mineral claims on 101
O'Donnel river 57, 90
O'Donnel Syndicate 90
Office Statistics:
  Ashcroft Mining Division 235
  Alberni ″ 244
  Ainsworth ″ 200
  Arrow Lake ″ 146
  Atlin ″ 93
  Cariboo ″ 50
  Clayoquot ″ 244
  Clinton ″ 242
  Fort Steele ″ 111
  Golden ″ 112
  Grand Forks ″ 223
  Greenwood ″ 220
  Kamloops ″ 233
  Lardeau ″ 121
  Lillooet ″ 242
  Nanaimo ″ 248
  Nelson ″ 145
  New Westminster ″ 268
  Northern Cassiar (Teslin, Liard and Stikine Mining Divisions) 97
  Omineca Mining Division 54
  Osoyoos ″ 227
  Quatsino ″ 245
  Revelstoke ″ 116
  Similkameen ″ 238
  Skeena ″ 103
  Slocan ″ 202
  Slocan City ″ 204

Office Statistics—*Concluded.*
  Trail Creek Mining Division 208
  Trout Lake ″ 119
  Vernon ″ 228
  Victoria ″ 253
  Windermere ″ 114
  Yale ″ 236
Oil shales, analyses of deposits at Harper's camp (Cariboo) 23
  Samples of, from Lytton 24
Oil District, Flathead 24
Okanagan lake 228
O. K. Group (Kamloops) 232
Olalla camp 225
Old Gold Company 198
Old Puss claim, dyke in, Siwash creek 236
Olds Group 224
OMINECA DISTRICT 52
  Report of Gold Commissioner 52
Omineca and Peace River Mining Co 52
Onward 41
Ophir-Lade Company 121
Opulence 226
Oro Denoro 221
Orphan Boy Group 231
Osmiridium, occurrence of 23, 41, 96
OSOYOOS MINING DIVISION 225
  Report of Gold Commissioner 225
Ottawa mine (Slocan) 164, 203
Ottawa Group (Atlin) 79
Otter creek 90
Otter Creek Hydraulic Company 90
Oyster District (Nanaimo) 247

P.

Pacific Development and Improvement Co 241
Paladora Group 224
Palladium, occurrence of 23, 41
Pan-American Group 234
Paradise Group 113
Payne mine 186, 200
  Report of Manager 186
Payne Consolidated Mining Co 186
Paystreak Group 245
Pearl Group (Similkameen) 239
Peerless 245
Penticton Group 227
Perry Creek Hydraulic Mining Co 110
Pierce claims 266
Pine creek 59, 84
  Pine Creek Power Co 59, 84

Pioneer Mining Co 166
  Report of Manager 167
Pitt lake 267
Placer Gold production 10, 20
    Dease Lake District 20
    Cariboo District 20
    Fraser River 20
  Hydraulic mining 20
  Dredging for gold 20
  Mining by steam shovels 20
Placer mining:
  Ashcroft Mining Division 234
  Kamloops ″ 233
  Nelson ″ 130
  Revelstoke ″ 115
  Yale ″ 235

Page.

Placer mining—*Concluded.*
  In East Kootenay 109
  On Fraser and Thompson rivers.......... 234
  Of deep gravels 43, 44
Platinum, occurrence of.................23, 41, 238
Pleasant Valley, Limited.................... 48
Point Company.................................. 44
Pontiac and *Tecumseh*.......................156, 199
Poorman-Granite 139
Poplar creek 118
Porcupine creek 177
Port Hope 203
Portland canal 99

Page.

Portland cement, manufacture of............ 256
Portland Consolidated Company 100
Porto Rico mine 126, 144
Prince Mining & Development Company 115
Princess Royal island 102
Princess Royal Group 102
Protection Island Colliery 277
Providence 213
Province 160, 198
Provincial Mineralogist, work of, for year...... 30
Provincial Assayer, work of 30
Puget Sound Iron Company 247

Q.

Quarrying ore in Boundary District............ 215
Quarries, stone, of the Coast.................... 248
  Report of Provincial Assayer................. 248
Quartz mining in Cariboo.......................... 48
Quartz mining in Atlin 74, 91
Quatsino King....................................... 245
QUATSINO MINING DIVISION........................ 245
  Report of Mining Recorder..................... 245

Queen mine..130, 143
Queen (New Westminster M. Div.) 266
Queen Bess Group................................... 189
Queen Charlotte Islands, mineral claims on..... 101
Queen-Dominion Mining Co......................... 189
QUESNEL MINING DIVISION........................... 37
  Report of Mining Recorder......................... 50
Quesnel river.......................................23, 48, 51

R.

Rabbit's Paw... 184
Rainy Hollow 55
Rambler-Cariboo mine...........................194, 201
Rambler-Cariboo Mines Company................ 194
Rampolla Group...................................... 224
Rawhide..211, 222
Reco mine...191, 200
Reco mine, values extracted from............. 192
Reco Mining and Milling Co...................... 191
Red Fox..196, 202
Red Jacket... 77
Red mountain (New Westminster M. Div.)..... 266
Red Mountain Company............................ 267
Red mountain (Slocan)............................. 202
Red Rock (Quatsino)............................... 245
R. E. Lee..196, 202
Reliance Gold Mining Company.................. 138
Relief Gold Mining Company..................... 129
RENFREW DISTRICT (Victoria M. Div.)........ 253
Republic (Slocan) 203

Republic Group (Greenwood).................... 213
Richard mountain (Victoria M. Div.) 253
Richard III. Mining Co.............................. 253
Riordan Mountain Group.......................... 227
River Dredging (*see* also Dredging for Gold).... 48
Rivers Group 242
Riverside... 204
Rocklands Group.................................... 173
Rock of Ages 78
Rosebery 197
ROSSLAND DISTRICT:
  Trail Creek Mining Division 205
  Report of Gold Commissioner.................. 205
Rossland (Vernon) 228
Rossland-Kootenay Mining Co..................... 207
Rossland Power Company 205
Rowse Fraction 181, 202
Ruby creek...70, 89
Ruby Creek Mining Partnership................... 89
Ruth mine 201

S.

Saanich arm 256
Sally 216
Salmon arm.. 232
Salmon river (Nelson M. D.)...................... 130
Salmon river (Skeena M. D.) 99
Sandon creek... 184
Sandon, mining in vicinity of:
  Report of Provincial Mineralogist............. 183
San Juan Mining Co 253
San Juan Iron Group 253
Sapphire 204
Saturna island stone quarry 249
Saucy Lass... 234
Saucy Sally 234
Saw-mill riffle.. 235
Scheelite, discovery of 49
Scranton 157
Searchlight... 226
Second Relief 129, 142
Senator 221
Seymour creek 267
Sharpless Mining Company....................... 139
Sidney inlet 244

Silicia creek 266
Silver and lead production of Province 21
  Total silver production.............................. 21
  „ lead „ 21
Silver Bell (Vernon)................................. 228
  „ (Ainsworth) 158, 198
  „ (Slocan) 202
Silver Cup and *Nettie L* 116
Silver Dollar 121
Silver Glance 199
Silver King 122, 136, 137
Silver Lake Group 99
Silver mountain 202
Silver Star Mining Co 159, 198
Silverton and vicinity, mining in:
  Report of Provincial Mineralogist............ 173
SIMILKAMEEN MINING DIVISION:
  Report of Mining Recorder...................... 238
Similkameen, lower.................................. 225
Siwash creek (Yale) 228, 235
  „ claims 236
  Notes on, by Provincial Assayer 236
Six-Mile creek (Vernon)............................ 228

Page.

- SKEENA MINING DIVISION:
  - Report of Gold Commissioner ... 99
  - Coal in ... 103
- Skookumchuck ... 268
- Skylark camp ... 212
- *Skylark Group* ... 212
- Slesse creek ... 266
- SLOCAN DISTRICT ... 147
  - Report of Prov. Mineralogist ... 147
  - 〃 Gold Commissioner ... 197
  - Ainsworth Mining Division:
    - Report of Gold Commissioner ... 197
    - 〃 Prov. Mineralogist ... 148
  - Slocan Mining Division:
    - Report of Mining Recorder ... 200
    - 〃 Prov. Mineralogist ... 171
  - Slocan City Mining Division:
    - Report of Mining Recorder ... 203
    - 〃 Prov. Mineralogist ... 163
- Slocan-Cariboo Co ... 48
- Slocan-Kilo Mining Co ... 168
- Slocan lake ... 171, 172
- *Slocan Prince Group* ... 203
- *Slocan-Republic* mine ... 170
- Slocan-Republic Mining Co ... 171
- *Slocan Star* mine ... 183, 200
- *Slocan Star* mill ... 186
- Slough creek ... 44
- Slough Creek Ltd ... 44
- Smelters, Boundary District ... 217
- Smelting and refining works of B. C ... 29
- Smelter, Montreal & Boston C. Co.'s ... 220
  - Hall Mining Co.'s ... 136
- Snake creek ... 90
- *Snowshoe* ... 222
- Snowshoe creek ... 42
- Société Minière de la Colombie Britannique ... 70, 88
- Sooke peninsula, geology of ... 254
- Sooke peninsula, iron ore deposits ... 255
  - Copper property (Victoria M. D.) ... 254
- *Southern Cross* ... 243

Page.

- SOUTH-EAST KOOTENAY DISTRICT ... 104
- *Sovereign* (Slocan) ... 201
- *Sovereign Group* (Similkameen) ... 239
- *Speculator* mine ... 166
- Spitzee Mines Co ... 207
- Spokane Falls Placer Mining Co ... 119
- *Spotted Horse* ... 127
- Spring creek ... 199
- Springer creek ... 165, 203
- Spruce creek ... 57, 71, 85
- Spruce Creek Power Co ... 71, 86
- Spruce creek, dredging for gold on ... 73
- Spyglass Mining Company ... 118
- Squamish ... 267
- *Star* mine ... 139
- *Star of Hope Group* ... 226
- Statistical Tables I., II., III., IV., V., VI., VII., VIII., IX., X. and XI., explanation of ... 17, 18
  - *See* also Mineral Production.
- Stave lake ... 267
- Steam shovel, mining by ... 210
- *Stemwinder* ... 225
- *Stephendyke Group* Hydraulic Leases ... 85
- Stone Quarries of the Coast:
  - Report by Provincial Assayer ... 248
- Stone, building, on Coast ... 23
- Stouts gulch ... 43
- Stukey & Company ... 67
- *Stull* ... 228
- *Sturgis Group* ... 198
- *St. Eugene* mine and mill ... 104, 136, 270
- St. Mary's river, mineral claims on ... 109
- *Sullivan* mine ... 105, 270
- Summit camp (Similkameen M. D.) ... 221
- Summit City (Yale) ... 236
- Summit creek (Nelson) ... 131
- *Sunbeam* ... 77
- *Sunnyside* ... 227
- *Sunset Group* (Boundary Dist.) ... 211
- *Sunset* and *Trade Dollar* ... 196, 201
- Surprise lake ... 57, 62

T.

- Tacoma Smelting Co ... 243
- Tacoma Steel Co ... 246
- Taku river ... 55
- Taku arm ... 80
- *Tamarac* ... 203
- Tamihy creek ... 266
- Tamihy mountain ... 266
- Tar flats ... 66
- *Telaca* ... 266
- Telkwa river ... 102
- Telkwa river, coal on ... 103
- Telkwa camp ... 99
- Ten-Mile creek (Slocan) ... 204
- Ten-Mile creek (Nicola) ... 234
- Terrahina District ... 97
- Terrahina river ... 58
- TESLIN MINING DIVISION:
  - Report of Deputy Mining Recorder ... 96
- Teta river (Quatsino) ... 245
- Texada island ... 246, 251
- Thibert creek ... 23
- Thistle Gold Mining Co ... 47
- Three Forks, mining in vicinity of ... 181
  - Report of Provincial Mineralogist ... 181
- *Tin Cup* ... 267
- *Toboggan* ... 53
- Toby creek, Windermere ... 113
- Tod inlet ... 256
- Tom creek ... 53
- Toronto-Lillooet Gold Reefs Co ... 240
- TRAIL CREEK MINING DIVISION: Statistics of ore produced ... 205
  - Work done in mines, detailed statement of ... 206
- Tribute system of mining:
  - Slocan Mining Division ... 172
  - Slocan City Mining Division ... 163
  - Slocan District ... 197
- TROUT LAKE MINING DIVISION:
  - Report of Mining Recorder ... 116
- Troy Mines Co ... 177
- *Truth Group* ... 231
- Tunnel, new, *Rambler-Cariboo* mine ... 195
- Tuya river coal fields, report on ... 97
- Tyee Copper Company's Smelter ... 252
  - Tonnage ore treated at ... 246
- *Tyee* mine and neighbouring claims ... 252
  - Report on, by E. J. Hearn ... 252
- Twelve-Mile creek ... 204

U.

- Uchucklesit harbour ... 243
- *Union Group* ... 80

V.

Page.

- Van Anda Copper & Gold Co. 247
- *Van Anda* mine 246
- VANCOUVER ISLAND AND COAST 243
  - Alberni District 243
    - Alberni Mining Division 243
      - Report of Gold Commissioner 243
    - Clayoquot Mining Division:
      - Report of Mining Recorder 244
    - Quatsino Mining Division:
      - Report of Mining Recorder 245
  - Nanaimo District 246
    - Nanaimo Mining Division 246
      - Report of Gold Commissioner 246
  - Victoria District 252
    - Victoria Mining Division 252
      - Report of Mining Recorder 252
  - New Westminster District 266
    - Report of acting Mining Recorder 266
- Vancouver Island collieries 18

Page.

- Vancouver Island collieries—*Concluded.*
  - Output of coal 18
  - Output of coke 19
- Vancouver Island Exploration & Development Co 247
- Vancouver Island Mining & Development Co 252
- Vancouver Portland Cement Co 256
- Velvet Portland Mining Co. 205, 207
- Velvet Portland Mining Co.'s Concentrator 207
- VERNON DISTRICT 228
  - Vernon Mining Division 228
    - Report of Gold Commissioner 228
- VICTORIA DISTRICT 252
  - Victoria Mining Division 252
    - Report of Mining Recorder 252
    - Notes by Provincial Mineralogist 254
- *View* 207
- *Violet* 228
- Vital creek 53
- Vital Creek Mining Syndicate 53

W.

- *Wakefield Group* 175
- Wallace mountain 216
- War Eagle Consolidated Mining Co 206
- *Washington* 196
- *Waterloo Group* 224
- *Waverley* 46
- *Wellington* 216
- Wellington camp 222
- Wellington Colliery Co., Ltd 18, 278
- Western Fuel Company 18, 277
- *Westholme* 252
- *Westmont* 204
- *Wheal Tamar Group* 229, 231
- White Bear Mining Co., Consolidated 205, 207
- *White Moose Group* 81
- *White Quartz* 245
- *White Star Group* 76
- White's camp 222
- Whitewater camp 160
- *Whitewater* mine 199
- *Whitewater Deep* 199
- *Wilcox Group* 124, 141
- Willow river 45
- Willow River Mining Co. 45
- Williams creek 42
- *Williams* claim 46
- WINDERMERE MINING DIVISION 113
  - Report of Mining Recorder 113
- Woodbury creek 155, 197, 199
- Wright creek 90
- *Wyoming* 43

X.

- *X. L.* (Mount Sicker) 252

Y.

- YALE DISTRICT 229
    - Report of Gold Commissioner 229
  - Kamloops Mining Division:
    - Report of Gold Commissioner 229
  - Ashcroft Mining Division:
    - Report of Mining Recorder 234
  - Yale Mining Division:
    - Report of Mining Recorder 235
  - Similkameen Mining Division:
    - Report of Mining Recorder 238
- Yale Hydraulic Mining Co. 227, 235
- *Yankee Girl* 126, 141
- Yellow gravel deposit, Atlin 58
- *Yellowstone* mill 131
- Ymir Gold Mines Co 122, 140
- *Ymir* mine 122, 140
- *Young Bear Group* 203
- *Yreka* mine 245
- Yreka Copper Co 245
- *Yukon* (Nelson M. D.) 126

Z.

- Zinc, saving of, in mills (Slocan District) 22, 197
- Zinc ore, in Quatsino Mining Division 245
- Zinc ore, shipment of, from *Lucky Jim* (Slocan) 22

LIST OF ILLUSTRATIONS.

Looking down Hoboe Creek from Laverdière Group—Southern end of Atlin Lake.... .....Frontispiece.
Argenta Mines, Hamill Creek, Ainsworth Mining Division.......... Facing p. 152
Arlington-Speculator Mines, Slocan City Mining Division.......... 〃 168
Andesite Quarry, east workings, Haddington Island, Nanaimo Mining Division.......... 〃 248
Culver Classifier, used in Slocan Star Mill.......... 185
Enterprise Mine, Ten-Mile Creek, Slocan City Mining Division.......... 〃 168
Flow Sheet, Ivanhoe Mill, Sandon, B. C. (Plate).......... 〃 188
〃 Slocan Star Mill, Sandon B. C. (Plate).......... 〃 184
〃 St. Eugene Concentrator, Moyie, B. C. (Plate).......... 〃 104
〃 Highland Concentrator, Ainsworth.......... 150
Gabriola Island Sandstone Quarry, Nanaimo Mining Division.......... 〃 272
Georgia Stone Company's Quarry, Jack's Point, Nanaimo Harbour.......... 〃 272
Granite Quarry, Granite Island, New Westminster Mining Division.......... 〃 248
Highland Concentrator, Ainsworth.......... 〃 152
〃 〃 side elevation.......... 151
Individual Placer Mining, Boulder Creek, Atlin.......... 〃 80
Ivanhoe Concentrating Mill, Sandon, B. C.......... 〃 192
Lower "Glory Hole," Hunter V. Mine, Nelson Mining Division.......... 〃 144
Mountain Range, Slocan Mining Division.......... 〃 176
Newcastle Island Sandstone Quarry, Nanaimo Mining Division.......... 〃 240
Placer Mining in 1904 on Spruce Creek, Atlin.......... 〃 72
Pleasant Valley, near Barkerville, Cariboo.......... 〃 48
Red Mountain, on International Boundary, New Westminster Mining Division.......... 〃 16
Relief Gold Mining Company's Concentrator, Erie, Nelson Mining Division.......... 〃 128
Sketch map of Payne Mine, Sandon.......... 188
〃 of underground workings, Chambers Group Mines, Slocan Mining Division..... 191
〃 〃 〃 Mountain Con Mine, 〃 〃 193
Table showing Total Mineral Production of British Columbia (Plate).......... 8
Tamihy Mountain, Slesse Creek, New Westminster Mining Division.......... 〃 32
Taylor's Sandstone Quarry, Saturna Island.......... 〃 240
Thistle Gold Mining Co.'s Hydraulic Mine, Eight-Mile Lake, Cariboo.......... 〃 48
Undercurrent and gold-saving Table, Gold Run, Atlin, B. C.......... 68
Upper Terminal Tramway, Hunter V. Mine.......... 〃 144
Vancouver Portland Cement Company's Works, Tod Inlet, Victoria Mining Division.......... 〃 256
View from Skylark Trail, looking across Slocan Lake.......... 〃 128
Western Fuel Company's New Pithead, Nanaimo, B. C.......... 〃 288

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